RESEARCH TRIANGLE INSTITUTE

432U-2676-16

INSTALLATION RESTORATION PROGRAM
PHASE II - CONFIRMATION/QUANTIFICATION
STAGE 2

VOLUME 2 OF 4

for
Seymour Johnson Air Force Base, NC

by
Research Triangle Institute
Center for Environmental Measurements
P. O. Box 12194
Research Triangle Park, NC 27709

November 1988

FINAL REPORT

Prepared For

Headquarters Tactical Air Command
HQ TAC/SGPB
Langley Air Force Base, VA 23665-5007

United States Air Force
Occupational & Environmental Health Laboratory (USAFOEHL)
Brooks Air Force Base, Texas 78235-5501

APPENDICES

APPENDIX A

STATEMENT OF WORK

19 MAY 1986

INSTALLATION RESTORATION PROGRAM
PHASE II - CONFIRMATION/QUANTIFICATION (STAGE 2)
Seymour Johnson AFB North Carolina

I. DESCRIPTION OF WORK

The overall objective of the Installation Restoration Program (IRP) Phase II investigation is to assess potential contamination at past hazardous waste disposal and spill sites on Air Force installations. A series of staged field investigations may be required to meet this objective.

The purpose of this staged investigation is to undertake a field and laboratory study at Seymour Johnson AFB NC: (1) to confirm the presence or absence of contamination within the specified areas of investigation; (2) if possible, to determine the extent and degree of contamination and the potential for migration of those contaminants in the various environmental media; (3) to identify public health and environmental hazards of migrating pollutants based on State or Federal standards for those contaminants; and (4) to delineate additional investigations required beyond this stage to reach the Phase II objectives.

The Phase I IRP Report and Phase II Stage 1 Report (mailed under separate cover) incorporate the background and description of the sites/zones for this task. To accomplish this survey effort, the contractor shall take the following actions:

A. General Requirements

1. Conduct a literature search of local hydrogeologic conditions to complement the Phase I and Phase II Reports (mailed under separate cover). Use this data to determine optimum well depth and locations. Include the pertinent literature search information in an appendix of the Final Report. Develop the literature search data using the following guideline:

a. Topographic data

b. Geologic data

(1) Structure

(2) Stratigraphy

(3) Lithology

c. Hydrogeologic data

(1) Location of all existing and abandoned wells, including observation wells, springs, natural ponds and seepages, that occur on or off the installation within a one-mile radius of sites to be investigated

(2) Groundwater table and piezometric contours

(3) Depth to groundwater

(4) Surface and groundwater quality

(5) Recharge, discharge and contributing areas

(6) Geologic setting, yield and hydrographs of springs and natural seepages

d. Data on all existing and abandoned wells, to include observation holes, on or off the installation and within a one-mile radius of sites to be investigated

(1) Location, depth, diameter, types of wells, and logs

(2) Static and pumping water levels, hydrographs, yield and specific capacity

(3) Present and projected groundwater development and use

(4) Corrosion, incrustation, well interference, and similar operation and maintenance problems

(5) Observation well networks

(6) Existing water sampling sites

e. Aquifer data

(1) Type, such as unconfined, artesian, or perched

(2) Thickness, depths, and formational designation

(3) Boundaries

(4) Transmissivity, storativity, and permeability

(5) Specific retention

(6) Discharge and recharge

(7) Ground and surface water relationships

(8) Aquifer models

(9) Vertical conductance of aquitards where applicable.

f. Climatic data

(1) Precipitation (total and net)

(2) Evapotranspiration

2. Determine the areal extent of the sites by reviewing historical and current panchromatic and infrared aerial photography.

B. Technical Operations Plan

Immediately after the Notice To Proceed (NTP) for the delivery order, develop a Technical Operations Plan (TOP) based on the technical requirements specified in this task description. (See Sequence No. 19, Item VI below). Follow the TOP format (mailed under separate cover). Provide the TOP to the USAFOEHL within two weeks of the NTP.

C. Health and Safety

Comply with USAF, OSHA, EPA, State and local health and safety regulations regarding the proposed work effort. Use EPA guidelines for designating the appropriate levels of protection needed at the study sites. Prepare a written Health and Safety Plan for the proposed work effort and coordinate it directly with applicable regulatory agencies prior to commencing field operations. Provide an information copy of the Health and Safety Plan to the USAFOEHL after coordination with regulatory agencies. The Health and Safety Plan is specified in Sequence No. 7, Item VI below.

D. Drilling and Soils Work

1. Determine the exact location of all monitor wells and soil borings during the planning/mobilization phase of the field investigation. Consult with base personnel to minimize disruption of base activities, to properly position wells with respect to exact site locations, and to avoid underground utilities. Direct the drilling and sampling and maintain a detailed log of the conditions and materials penetrated during the course of the work. Do not drill boreholes into or position wells in actual landfill areas; install wells at the landfill perimeter.

2. Monitor the ambient air during all well drilling and soil boring work with a photoionization meter or equivalent organic vapor detector to identify the generation of potentially hazardous and/or toxic vapors or gases. Include air monitoring results in the boring logs. If soil encountered during borehole drilling is suspected to be hazardous because of discoloration, odor or air monitoring levels, containerize the soil cuttings in new, unused drums. Enter into the boring logs the depth(s) from which suspected contaminated soil cuttings were collected for containerization. Collect a maximum of 3 composite samples, one from the contents of each drum. Test each composite sample for EP Toxicity (metals). Use RCRA criteria to determine if soil cuttings must be classified as hazardous waste (40 CFR 261.24).

3. Groundwater Monitoring Wells

a. Installation of Ground Water Monitoring Wells

(1) Comply with the U.S. EPA Publication 330/9-S1-002, NEIC Manual for Ground Water/Subsurface Investigations at Hazard Waste Sites for monitoring well installation.

(2) All well drilling, development, purging, sampling methods, and other activity pertaining to this effort must conform to State and other applicable regulatory agency requirements. Cite references in an appendix to the Final Report.

(3) Install wells at a sufficient depth to collect samples representative of aquifer quality and to intercept contaminants if they are present.

(4) Avoid, when possible, installing wells in depressions or areas subject to frequent flooding and standing water. If wells must be installed in such areas, design the wells such that standing water does not leak into the top of the casing or cascade down the annular space.

(5) Drill all monitoring wells using the following specifications:

(a) Drill wells using hollow-stem auger techniques. A center stem, plug, and bit attached to the stem may be inserted into the auger for use while drilling. This will prevent material from entering into the hollow stem of the auger.

(b) Take lithologic samples at five-foot intervals and prepare borehole log descriptions. Include pilot boring logs and well completion summaries in the Final Report (Sequence 4, Item VI, below).

(c) Drill a maximum of 15 wells. Total footage for all wells in this task shall not exceed 550 linear feet. Refer to the site specific details in Section I.H.

(d) Construct each well with two-inch inside diameter (I.D.) Schedule 80 PVC casing. Use threaded screw-type joints, glued fittings are not permitted. Flush thread all connections. Screen each well using two-inch I.D. casing having up to 0.020 inch slots; slot size may be smaller based upon borehole geology. Screen material must be the same as that of the casing. Cap the bottom of the screen.

(e) Screen all wells so as to collect floating contaminants and to allow for yearly fluctuations of the water table. Screen all shallow wells a minimum of ten feet. Screen deep wells a minimum of 20 feet.

(6) Complete all monitoring wells using the following specifications:

(a) Once the casing is installed, allow the soil formation to collapse around the well screen. Supplement the natural gravel-pack with washed and bagged rounded silica sand or gravel with a grain size distribution compatible with the screen and soil formation. Place the pack from the bottom of the borehole to two feet above the top of the screen. Tremie a one foot bentonite seal (granulated or pellets) above the sand/gravel pack. Ensure the bentonite forms a complete seal. Grout the remainder of the annulus to the land surface with a Type I Portland cement/bentonite slurry.

(b) Check with the base point of contact (POC) to determine whether wells shall be completed flush or project above the ground surface.

1 If well stick-up is of concern in an area, complete the well flush with the land surface. Cut the casing two to three inches below land surface, and install a protective locking lid consisting of a cast-iron valve box assembly. Center the lid assembly in a three foot diameter concrete pad sloped away from the valve box. Ensure that free drainage is maintained within the valve box. Also, provide a screw-type casing cap to prevent infiltration of surface water. Maintain a minimum of one foot clearance between the casing top and the bottom of the valve box. Clearly mark the well number on the valve box lid. Tag the monitoring well with following information "Non-potable water supply well--groundwater may contain hazardous material".

2 If an above ground surface completion is used, extend the well casing two or three feet above land surface. Provide an end-plug or casing cap for each well. Shield the extended casing with a steel guard pipe which is placed over the casing and cap, and seated in a two-foot by two-foot by four-inch concrete surface pad. Slope the pad away from the well sleeve. Install a lockable cap or lid on the guard pipe. Install three, three-inch diameter steel guard posts if the base POC determines the well is in an area which needs such protection. The guard posts shall be five feet in total length and installed radially from each wellhead. Recess the guard posts approximately two feet into the ground. Do not install the guard posts in the concrete pad placed at the well base. Paint the protective steel sleeve and clearly number the well on the sleeve exterior. Tag the monitoring well with the following information "Non-potable water supply well--ground-water may contain hazardous material."

3 Provide locks for both flush and above-ground well assemblies. Turn over the lock keys to the base POC following completion of the field effort.

(c) Develop each well as soon as practical after completion with a submersible pump, bailer, and/or airlift method. Continue well development until the discharge water is clear and free of sediment to the fullest extent possible. Measure the rate of water produced, the pH, specific conductance and water temperature during well development and include this information in the final report.

(d) Determine by survey the elevation of all newly installed monitoring wells to an accuracy of 0.01 foot. Notch the top of the riser casing where well elevations are established. Horizontally locate the new wells to an accuracy of 1.0 feet and record the position on both project and site specific maps. Bench marks used must have previously been established from and are traceable to a USCGS or USGS survey marker.

(e) Measure water levels at all monitoring wells as feet below the ground surface or below the top of casing elevation to the nearest 0.01 foot. Report as mean sea level (MSL). Measure static water levels in wells prior to well development and before all well purging which precedes sampling events.

b. Recommend a candidate well abandonment method(s) or technique(s) which is applicable to the type of monitoring wells installed and geological conditions. Consider that these wells will be abandoned at some future date after the study objectives have been met and there is no longer a need for the wells. The actual process of well abandonment is not a part of this task order. Assure that the recommended method(s) meets State and/or local well abandonment guidelines or regulations.

c. Complete permits, applications, and other documents which may be required by local and/or State regulatory agencies for the installation of monitor wells. File these documents with appropriate agencies and pay all permitting and filing fees.

4. Soil Borings

a. Conduct a maximum of 6 soil borings not to exceed a total of 120 linear feet. Accomplish the borings using hollow-stem auger techniques. Obtain split-spoon samples at five foot intervals, using ASTM Method D-1586. Refer to Section I.H., for soil sample collection details.

b. Scan all split-spoon soil cores with a photoionization meter or equivalent organic vapor detector. Include monitoring results in the boring logs.

c. During the boring operations, describe lithologies encountered and prepare stratigraphic logs. Place special emphasis on field identification of contaminated soils encountered.

d. Whenever possible, measure water levels in all boreholes after the water level has stabilized. Examine the water surface for the presence of hydrocarbons. Include this information in the boring logs.

e. Tremie-grout all boreholes to the surface with bentonite. It is especially important to insure that they be adequately resealed to preclude future migration of contaminants.

f. Permanently mark each location where soil borings are drilled. Record the location on a project map for each specific site or zone, whichever is applicable.

5. Well and Borehole Cleanup

Remove all well/borehole cuttings and clean the general area following the completion of each well/borehole. Containerize and store cuttings suspected to be contaminated according to paragraph I.D.2. of this task order. Transport these drums to a location within the installation boundary designated by the POC. The base is responsible for ultimate disposal of contaminated soils using base resources.

E. Decontamination Procedures

1. Decontaminate all sampling equipment, including internal components, prior to use and between samples to avoid cross contamination. Wash equipment with a laboratory-grade detergent followed by drinking quality water, reagent-grade solvent (methanol), and distilled water rinses. Allow sufficient time for the solvent to evaporate and the equipment to dry completely before reuse.

2. Dedicate for each well the monofilament line or steel wire used to lower sampling equipment into the well; do not use a line in more than one well. Decontaminate the calibrated water level probe for measuring well volume and water level elevation before use in each well.

3. Thoroughly clean and decontaminate the drilling rig and tools before initial use and after each borehole completion. As a minimum, steam clean drill bits after each borehole is installed. Drill from the "least" to the "most" contaminated sites, if possible.

F. Field Sampling

1. Strictly comply with the sampling techniques, maximum holding times, and sample preservation as specified in the following references: Standard Methods for the Examination of Water and Wastewater, 16th Edition (1985), pages 37-44; ASTM, Section 11, Water and Environmental Technology; Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 2nd Edition (USEPA, 1984); Methods for Chemical Analysis of Waters and Wastes, EPA Manual 600/4-79-020, pages xiii to xix (1983); and the Handbook for Sampling and Sample Preservation of Water and Wastewater, EPA Document 600/4-82-029 (1982).

2. Groundwater Monitoring Wells

a. Allow wells to stabilize after development for a minimum of 1 day before sampling.

b. Prior to purging the wells, examine the surface of the water table for the presence of hydrocarbons and take water level measurements to the nearest 0.01 foot with respect to the established survey point on top of the well casing. If applicable, measure the thickness of the hydrocarbon layer.

c. Purge the well using a submersible pump, bailer, or other pertinent method. Purge until a minimum of three well volumes (based on borehole diameter) of water have been displaced and the pH, temperature, specific conductance, color, and odor of the discharge have stabilized using the following criteria: pH ± 0.1 unit, temperature ± 0.5°C, and specific conductance ± 10 µmhos. Include the final measurements in the Results section of the report.

d. Collect water samples with a Teflon bailer. However, to collect representative aquifer samples where floating hydrocarbons are present, use a "thief sampler" or similar device to minimize the influence of the free product.

e. If the well(s) cannot be sampled due to well development, well characteristics, or other reason(s), indicate the reason(s) in the report (Sequence 4, Item VI below).

f. Remeasure water levels after sampling and when the wells have stablized.

3. For surface water/sediment samples, collect one surface water sample and one sediment sample at each sample location specified. Collect samples so as not to cause cross-contamination; obtain downstream samples first, and obtain the water sample at each location before the sediment sample. Measure on site the pH, temperature, and specific conductance for all water samples.

4. Split all water and soi_ samples. Analyze one set and immediately deliver the other set (the same collection day) to the base POC. The base POC will select 10% of the split samples, package the selections with appropriate forms, and deliver them to the contractor within 24 hours of receipt. Supply all packing and shipping materials to the base POC for packaging the split samples. Immediately ship (within 24 hours) the POC selected samples through overnight delivery to:

USAFOEHL/SA
Bldg 140
Brooks AFB TX 78235-5501

For all split samples sent to the USAFOEHL, complete an AF Form 2752A "Environmental Sampling Data" and/or an AF Form 2752B "Environmental Sampling Data - Trace Organics", (working copies will be provided under separate cover) with the following information:

a. Date and time collected

b. Purpose of sample (analyte and sample group)

c. Installation name (base)

d. Sample number

e. Source/location and depth of sample

f. Contract Task Numbers and Title of Project

g. Method of collection (bailer, suction pump, air-lift pump,etc.)

h. Volumes removed before sample taken (well samples only)

i. Special Conditions (use of surrogate standard, etc.)

j. Preservatives used

k. Collector's name or initials

In addition, label each sample container with a permanent ink pen (laundry marker) to reflect the data in a, b, c, d, j and k above.

5. For every 10 field samples collected, take at least one additional sample (a field duplicate) for quality control purposes. Table 1 provides a 10% allowance for these additional analyses. Include all quality control data in the draft and final reports. Duplicates shall be indistinguishable from other analytical samples such that personnel performing the analyses are not able to determine which samples are duplicates.

6. For every 20 field water samples collected, prepare and submit for analysis one field blank for all parameters analyzed in water. Assure that the water used for field blanks has been tested and is free from contaminants which would interfere with the required analyses. A minimum of one field blank for each parameter is required. Allowances for these additional analyses are included in Table 1.

7. Maintain chain-of-custody records for all samples, field blanks, and quality control samples.

G. Chemical Analyses

1. Analyze water and soil samples collected as specified in Section H below, Specific Site Work. The analytical parameters are summarized in Table 3 along with the required methods.

2. All analyses shall meet the required limits of detection for the applicable EPA method identified in Table 3.

3. For those methods which employ gas chromatography (GC) as the analytical technique (E601, SW8010, SW8015,SW8020) positive confirmation of identity is required for all analytes having concentrations higher than the Method Detection Limit (MDL). Conduct positive confirmation by second-column GC; however, gas chromatography/mass spectroscopy (GC/MS) can be used for positive confirmation if the quantity of each analyte to be confirmed is above the detection level of the GC/MS instrument. Analytes which cannot be confirmed will be reported as "Not Detected" in the body of the report, but

results of all second-column GC or GC/MS confirmational analyses are to be included in the report appendix along with other raw analytical data. Base the quantification of confirmed analytes on the first-column analysis. The maximum number of second-column confirmational analyses shall not exceed fifty percent (50%) of the actual number of field samples (to include duplicates). The total number of samples for each GC method listed in Table 1 includes this allowance. If GC/MS, or a combination of second-column GC and GC/MS, is used, the total cost of all such analyses for a particular parameter shall not exceed the funding allowed for positive confirmation using only second-column GC.

4. All chemical/physical analyses shall conform to state and other applicable federal and local regulatory agency legal requirements. If a regulatory agency specifies that a type of analysis be performed in a certified laboratory, assure compliance with the requirement and furnish documentation showing laboratory certification with the first analytical data supplied to the USAFOEHL/TS.

5. Archive all raw data, including QA/QC standards and data, for not less than five years after project completion. Supply this data to the USAFOEHL/TS upon request.

H. Specific Site Work

In addition to items delineated in I.A. through I.G. above, conduct the following specific actions at the sites identified in Table 4 as noted below:

1. Fire Training Area 3

a. Drill and construct three shallow groundwater monitoring wells. One well shall be located southeast in the assumed upgradient direction of groundwater flow. Two monitoring wells shall be located downgradient, one north and one northeast of the Fire Training Area.

b. Collect one groundwater sample from the existing monitoring well and three newly constructed monitoring wells. Analyze each groundwater sample for the parameters listed in Table 5.

2. Landfill 4

a. Drill and construct six shallow monitoring wells. One monitoring well shall be located upgradient of Landfill 4 and the remaining five monitoring wells shall be located downgradient between the landfill boundary and Stoney Creek.

b. Drill and construct one monitoring well downgradient between the landfill boundary and Stoney Creek, screened in the next underlying aquifer.

c. Collect one groundwater sample from both of the existing monitoring wells and seven newly installed monitoring wells. Analyze each groundwater sample for the parameters listed in Table 6.

d. Collect a maximum of two liquid samples from landfill seeps, if found, at Landfill 4. Analyze these samples for the parameters listed in Table 6.

e. Collect a maximum of two sediment samples along the natural runoff channels between Landfill 4 and Stoney Creek. Analyze the sediment samples for the parameters found in Table 7.

3. Landfill 1

Collect one groundwater sample from the existing monitoring well at Landfill 1. Analyze the groundwater sample for the parameters listed in Table 6.

4. Landfill 3

a. Use historic aerial photographs to determine the exact boundary location for Landfill 3.

b. Drill and construct four shallow groundwater monitoring wells. One monitoring well shall be located southeast of Landfill 3 in the assumed upgradient direction of groundwater flow. The remaining three monitoring wells shall be located in the assumed downgradient direction of groundwater flow between Stoney Creek and Landfill 3.

c. Collect one groundwater sample from each of the newly constructed monitoring wells. Analyze each groundwater sample for the parameters listed in Table 6.

5. DPDO Waste Storage Area

a. Drill and construct one shallow monitoring well west of the Waste Storage Area in the assumed downgradient direction of groundwater flow.

b. Collect one groundwater sample from the newly installed monitoring well and analyze for the parameters found in Table 8.

c. Drill three deep soil borings in a downgradient position from the waste storage tank. Locate each soil boring greater than 100 feet from the storage tank. Each soil boring shall be terminated at the groundwater table, or at a maximum of 30 feet.

d. Collect soil samples at 5 foot intervals from each soil boring and analyze for the parameters found in Table 9.

e. Collect two surface runoff samples, if obtainable, from natural channels between the waste storage tank and Stoney Creek. Analyze these surface runoff samples for the parameters found in Table 8.

f. Collect two sediment samples from natural channels between the waste storage tank and Stoney Creek. Analyze the sediment samples for the parameters listed in Table 9.

6. Coal Pile

a. Drill two shallow soil borings at the location of the coal pile near Building 2700. The maximum depth of each soil boring shall not exceed 10 feet. Collect soil samples at the 2.5 foot, 5 foot and 10 foot intervals. Analyze the soil samples for the parameters found in Table 10.

b. Collect one shallow soil boring at an uncontaminated location within the installation boundary to be used as a background sample. The maximum depth of the soil boring shall not exceed 10 feet. Collect soil samples at the 2.5 foot, 5 foot and 10 foot intervals. Analyze the soil samples for the parameters found in Table 10.

I. Data Review

1. Tabulate field and analytical laboratory results, including field and laboratory parameters and QA/QC data, as they become available and incorporate them into the next monthly R&D Status Report (Sequence No.1, Item VI below) forwarded to the USAFOEHL. In addition to the results, report the following:

a. the time and dates of sample collection, extraction (if applicable) and analysis;

b. the method used and Method Detection Limits achieved;

c. the chain-of-custody forms;

d. a cross-reference of laboratory sample numbers and field sample numbers; and

e. a cross-reference of field sample numbers to wells, boreholes, sites, etc.

2. Upon completion of all analyses, tabulate and incorporate all results into an Informal Technical Information Report (Sequence No. 3, Item VI below) and forward the report to USAFOEHL for review a minimum of two weeks prior to submission of the draft report. Provide as a minimum the information specified in I.I.1 above.

3. Immediately report to the USAFOEHL Program Manager or his supervisor via telephone, data/results generated during this investigation which indicate a potential health risk (for example, a contaminated drinking water aquifer). Follow the telephone notification with a written notice within three days; attach a copy of the laboratory raw data (i.e., chromatograms for sample and standards run with sample).

J. Reporting

1. Prepare a draft report delineating all findings of this field investigation and forward it to the USAFOEHL (as specified in Sequence No. 4, Item VI below) for Air Force review and comment. Strictly adhere to the USAFOEHL report format (mailed under separate cover). The format is an integral part of this delivery order. Draft reports are considered "drafts" only in the sense that they have not been reviewed and approved by Air Force officials. In all other respects, "drafts" must be complete, in the proper format, and free of grammatical and typographical errors. Include as a minimum, discussion of the regional/site specific hydrogeology, well and boring logs, data from water level surveys, groundwater surface and gradient maps, water quality and soil analysis results, available geohydrologic cross sections, and laboratory and field QA/QC information. For State's requiring the field work or technical effort be supervised by a State registered geologist, engineering geologist or professional engineer, insert this information in the report to include registration numbers, certificates and seals (as appropriate).

2. Review the Results, Conclusions and Recommendations concerning the sites listed in this task which were investigated during a previous IRP Phase II staged work effort. Use this information and data from previous efforts to establish trends and develop conclusions and recommendations. Integrate all investigative work done at each site to date so the report reflects the total cumulative information for each site studied in this effort.

3. In the Results section, include water and soil analytical results and field quality control sample data. Report all internal laboratory quality control data (lab blanks, lab spikes and lab duplicates) and laboratory quality assurance information in an appendix of the report. Also provide second-column confirmation results and quantities, and include which columns were used, instrument operating conditions, and retention times. Summarize in the appendix the specific collection technique, analytical method (Standard Methods, EPA, etc.), holding time, and limit of detection for each analyte .

4. Make estimates of the magnitude, extent and direction which detected contaminants are moving. Identify potential environmental consequences of the discovered contaminants, where known, based upon State or Federal standards.

5. Plot and map all field data collected for each site according to surveyed positions.

6. In the Recommendation section, address each site and list them by category:

a. Category I consists of sites where no further action (including remedial action) is required. Data for these sites are considered sufficient to rule out unacceptable public health or environmental hazards.

b. Category II sites are those requiring an additional Phase II effort to determine the direction, magnitude, rate of movement and extent of detected contaminants. Identify potential environmental consequences of discovered contamination.

c. Category III sites are those that will require remedial action (ready for IRP Phase IV). In the recommendations for Category III sites, include any possible influence on sites in Categories I and/or II due to their connection with the same hydrological system. Clearly state any dependency between sites in different categories. Include a list of candidate remedial action alternatives, including Long Term Monitoring (LTM) as remedial action, and the corresponding rationale that should be considered in selecting the remedial action for a given site. List all alternatives that could potentially bring the site into compliance with environmental standards. For contaminants that do not have standards, EPA recommended safe levels for noncarcinogens (Health Advisory or Suggested-No-Adverse-Response Levels) and target levels for carcinogens (1 x 10 cancer risk level) may be used. Unless specifically requested, do not perform any cost analyses, or cost/benefit review for remedial action alternatives. However, in those situations where field survey data indicate immediate corrective action is necessary, present specific, detailed recommendations.

For each category above, summarize the results of field data, environmental or regulatory criteria, or other pertinent information supporting conclusions and recommendations. Reduce this summary information into a table (or tables) and insert it (or them) into the text and the Executive Summary.

7. Provide cost estimates by line item for future efforts recommended for Category II sites and LTM Category III sites. Submit these estimates concurrently with the approved final technical report in a separate document. Only the cost requirements outlined in Sequence No. 2, Item VI, need be submitted.

a. For Category II sites, develop detailed site-specific estimates using prioritized costing format (i.e., cost of conducting the required work on: the highest priority site only; the first two highest priority sites only; the first three highest priority sites only; etc., until all required work is discretely costed) for the proposed work effort. The Air Force determines the priority of sites from contractor recommendations. Consider the type of contaminants, their magnitude, the direction and rate of their migration, and their subsequent potential for environmental and health consequences when developing recommendations for site prioritization.

b. For Category III sites slated for long term monitoring, develop site specific estimates which detail the costs associated with: (1) permanent installation of monitoring wells; (2) ground water sampling interface equipment, including permanent installation of pumps and sampling lines; and (3) four quarterly (1 year period) sample collections and laboratory chemical analyses of ground water, etc.

8. Provide an inventory of all on-base wells, to include production, irrigation, monitoring, etc. If the well has been abandoned, note the reason.

9. Reference in an appendix any local, State and/or Federal regulations which require specific well drilling techniques, materials, well development, purging, and sampling methods as specified in this work effort.

II. SITE LOCATION AND DATES: None

III. BASE SUPPORT:

A. Prior to any contractor digging or drilling, the Base Civil Engineer will locate underground utilities and issue digging permits.

B. The Base Civil Engineer will assign accumulation points within the installation for the contractor to use to deliver any drill cuttings or well installation fluids generated from the required work which are suspected to be hazardous.

C. The Base Civil Engineer will take custody of any drill cuttings or well installation fluids suspected to be hazardous and properly dispose of the material according to applicable state and/or federal regulations.

D. The base will provide the contractor with existing engineering plans, drawings, diagrams, aerial photographs, etc., to evaluate sites under investigation.

E. The base POC will select 10% of the split samples provided by the contractor, package them, and ensure they are picked up by the contractor within 24 hours of sample receipt. See paragraph I.F.4.

F. The Base will arrange for and have available prior to the start-up of field work, the following services, materials, work space, and items of equipment to support the contractor conducting the survey:

1. Personnel identification badges, vehicle passes and/or entry permits.

2. A secure staging area for storing equipment and supplies.

3. A supply (i.e., fire hydrant) of large quantities (up to a maximum of 1,000 gallons) of potable water for equipment cleaning, etc.

4. A paved area where drilling equipment can be cleaned and decontaminated. A source of potable water (i.e., ordinary outdoor water faucet) and a 110/115 VAC electrical outlet must be available within 25 feet of the paved area for steam cleaner hookup. Drainage from this paved area should be through an oil/water separator to a sanitary sewer.

5. A temporary office area, not to exceed 100 square feet and equipped with a Class A telephone for local and long distance telephone calls. The contractor shall pay for any long distance telephone calls made by his personnel from this phone.

6. A household-type refrigerator having approximately 2 cubic feet of freezer space.

7. A set of keys to existing monitoring well locks. The contractor shall return the keys to the base when the survey has been completed.

IV. GOVERNMENT FURNISHED PROPERTY: None

V. GOVERNMENT POINTS OF CONTACT:

1. USAFOEHL Technical Program Manager
Capt Brian D. McCarty
USAFOEHL/TSS
Brooks AFB TX 78235-5501
(512) 536-2158
AUTOVON 240-2158/2159
1-800-821-4528

2. Base Point of Contact (POC)
Lt Steve Warren
USAF Hospital/SGPB
Seymour Johnson AFB NC 27531-5300
(919) 736-5556/5557
AUTOVON 488-5556/5557

3. MAJCOM Monitor
Col Jerry Dougherty
HQ TAC/SGPB
Langley AFB VA 23665-5001
(804) 764-5857
AUTOVON 574-5857

4. Base Civil Engineer POC
Mr Donny Jones
4 CSG/DEEV
Seymour Johnson AFB NC 27531-5005
(919) 736-6501
AUTOVON 488-6501

VI. In addition to sequence numbers 1, 5 and 10 listed in Attachment 1 to the contract, and which apply to all orders, the sequence numbers listed below are applicable to this order. Also shown are dates applicable to this order.

Sequence No.	Para No.	Block 10	Block 11	Block 12	Block 13	Block 14
19 (TOP)*	I.B.	OTIME	31 Jul 86	31 Jul 86		15
7 (Health & Safety)	I.C.	OTIME	31 Jul 86	31 Jul 86		3
3 (Prelim Data)	I.I.2	OTIME	**	**		3
4 (Tech. Rpt)	I.J.1.	ONE/R	30 Sep 86	31 Oct 86	31 Aug 87	***
2 (cost data)	I.J.7.	OTIME	27 Feb 87	30 Jun 87		****
14		MONTHLY	29 Aug 86	29 Aug 86	*****	3
15		MONTHLY	29 Aug 86	29 Aug 86	*****	3

*The Technical Operations Plans (TOP) required for this stage is due within two weeks of the Notice to Proceed.

**Upon completion of the total analytical effort and before submission of the first draft report.

***Two draft reports (25 copies of each) and one final report (50 copies plus the original camera ready copy) are required. Incorporate Air Force comments into the second draft and final reports as specified by the USAFOEHL. Supply the USAFOEHL with an advance copy of the first draft, second draft, and final reports for acceptance prior to distribution. Distribute the remaining 24 copies of each draft report and 49 copies of the final report as specified by the USAFOEHL.

****Submit cost estimates (five copies) in a separately bound document with the Final Report only. Provide estimates for only those sites recommended for additional Phase II work (Category II) and Phase IV, Long Term Monitoring, (Category III).

*****Submit monthly hereafter.

TABLE 1: SAMPLING AND ANALYTICAL REQUIREMENTS
Seymour Johnson AFB NC

		Sites								
Analyte	Medium	FireTraining Area 3	Landfill 4	Landfill 1	Landfill 3	DPDO Waste Storage Area	Coal Pile	QA[11]	2nd Column[12] Confirmation	Total
Petroleum Hydrocarbons	water	4	11	1	4	3	0	3	NA	26
	soil	0	2	0	0	20	0	2	NA	24
VOC[1]	water	4	11	1	4	3	0	3	13	39
	soil	0	2	0	0	20	0	2	12	36
13 Priority Pollutant Metals[2]	water	0	11	1	4	3	0	2	NA	21
	soil	0	2	0	0	20	0	2	NA	24
Extractable Priority Pollutants[3]	water	0	11	1	4	3	0	2	NA	21
	soil	0	2	0	0	20	0	2	NA	24
Lead[4]	water	4	0	0	0	0	0	1	NA	5
	soil	0	0	0	0	0	0	0	NA	0
Common Anions[5]	water	0	11	1	4	3	0	2	NA	21
	soil	-	-	-	-	-	-	-	-	-
Non-Halogenated Volatile Organics[6]	water	0	0	0	0	3	0	1	2	6
	soil	0	0	0	0	20	0	2	11	33
Total Cyanide[7]	water	0	0	0	0	3	0	1	NA	4
	soil	0	0	0	0	20	0	2	NA	22
Alkalinity[8]	water	0	0	0	0	3	0	1	NA	4
	soil	-	-	-	-	-	-	-	-	-
Total Metals Screen[9]	water	-	-	-	-	-	-	-	-	-
	soil	0	0	0	0	0	9	1	NA	10
EP Toxicity[10]	soil	3 samples authorized as needed, not specified by site.						1	NA	4

[1]See Table 2 for VOC compounds.

[2]Priority Pollutant Metals include: antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury nickel, selenium, silver, thallium, zinc

[3]Extractable Priority Pollutants include 72 compounds under Method E625 and 81 compounds under SW8270.

[4]Lead analysis under Method E239.2.

[5]Bromide, chloride, fluoride, nitrate, nitrite, phosphate and sulfate.

[6]Acrylamid, carbon disulfide, diethyl ether, methyl ethyl ketone, methyl isobutyl ketone, paraldehyde.

[7]Total cyanide analysis under Method A412D.

[8]Bicarbonate, carbonate and hydroxide alkalinity reported separately.

[9]Aluminum, antimony, barium, beryllium, boron, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, molybdenum, nickel, potassium, silica, silver, sodium, thallium, vanadium, zinc.

[10]EP Toxicity test for metals only specified under 40 CFR 261.24. See Table 3.

[11]QA is 10% of the basic sample load plus a field blank for every 20 water samples per parameter.

[12]Assumes 50% of Methods E601, SW8010, SW8015, and SW8020. Samples will require second column confirmation.

TABLE 2
VOLATILE ORGANIC AND AROMATIC COMPOUNDS (VOC)

Purgeable Halocarbons
EPA Method 601 ~~and Selected SW8010 Compounds~~

Bromodichloromethane
Bromoform
Bromomethane
Carbon tetrachloride
Chlorobenzene
Chloroethane
2-Chloroethylvinyl ether
Chloroform
Chloromethane
Dibromochloromethane
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
Dichlorodifluoromethane
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethene
trans-1,2-Dichloroethene
1,2-Dichloropropane
cis-1,3-Dichloropropene
trans-1,3-Dichloropropene
Methylene chloride
1,1,2,2-Tetrachloroethane
Tetrachlorethylene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethylene
Trichlorofluoromethane
Vinyl Chloride

Purgeable Aromatics
EPA Method ~~8020~~ 602

Benzene
Chlorobenzene
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
Ethylbenzene
Toluene
o-xylene
p-xylene
m-Xylene

TABLE 3

Analytical Parameters, Methods and Required Detection Limits

Parameter	Method	Detection Limit
Petroleum Hydrocarbons - water	E418.1	1 mg/L
Petroleum Hydrocarbons - soil	SW3550/E418.1	1 mg/kg
Aromatic volatile organics - water	~~SW5030/SW8020~~ E602	a
Aromatic volatile organics - soil	~~SW5030/SW8020~~ E602	a
Halogenated volatile organics - water	E601	a
Halogenated volatile organics - soil	~~SW5030/SW8010~~ E601	a
13 Priority Pollutant Metals - water		
arsenic	E206.2	0.001 mg/L
antimony	E200.7	0.032 mg/L
beryllium	E200.7	0.0003 mg/L
cadmium	E200.7	0.004 mg/L
chromium	E200.7	0.007 mg/L
copper	E200.7	0.006 mg/L
lead	E200.7	0.042 mg/L
mercury	E245.1	0.0002 mg/L
nickel	E200.7	0.015 mg/L
selenium	E270.2	0.002 mg/L
silver	E200.7	0.007 mg/L
thallium	E200.7	0.040 mg/L
zinc	E200.7	0.002 mg/L
13 Priority Pollutant Metals - soil		
arsenic	SW3050/SW7060	0.1 mg/kg
antimony	SW3050/SW6010	3.2 mg/kg
beryllium	SW3050/SW6010	0.03 mg/kg
cadmium	SW3050/SW6010	0.4 mg/kg
chromium	SW3050/SW6010	0.7 mg/kg
copper	SW3050/SW6010	0.6 mg/kg
lead	SW3050/SW6010	4.2 mg/kg
mercury	SW7471	0.1 mg/kg
nickel	SW3050/SW6010	1.5 mg/kg
selenium	SW3050/SW7740	0.2 mg/kg
silver	SW3050/SW6010	0.7 mg/kg
thallium	SW3050/SW6010	4.0 mg/kg
zinc	SW3050/SW6010	0.2 mg/kg
Extractable Priority Pollutants - water	E625	a
Extractable Priority Pollutants - soil	SW3550/~~SW8270~~/E625	a
Lead - water	E239.2	0.002 mg/L

Parameter	Method	Detection Limit
Common Anions - Water		
bromide	A429	0.1 mg/L
chloride	A429	0.1 mg/L
fluoride	A429	0.05 mg/L
nitrate	A429	0.1 mg/L
nitrite	A429	0.1 mg/L
phosphate	A429	0.1 mg/L
sulfate	A429	0.1 mg/L
Non-Halogenated Volatile Organics - water or soil	SW5030/SW8015	a
Total Cyanide - water	~~A412D~~ E 335.2	0.020 mg/L
Total Cyanide - soil	~~A412D~~ E 335.2	20 mg/kg
Alkalinity - water		
bicarbonate	A403	10 mg/L
carbonate	A403	10 mg/L
hydroxide	A403	10 mg/L
Total Metals Screen - soil		
aluminum	SW3050/SW6010	4.5 mg/kg
antimony	SW3050/SW6010	3.2 mg/kg
barium	SW3050/SW6010	0.2 mg/kg
beryllium	SW3050/SW6010	0.03 mg/kg
boron	SW3050/SW6010	0.5 mg/kg
cadmium	SW3050/SW6010	0.4 mg/kg
calcium	SW3050/SW6010	1.0 mg/kg
chromium	SW3050/SW6010	0.7 mg/kg
cobalt	SW3050/SW6010	0.7 mg/kg
copper	SW3050/SW6010	0.6 mg/kg
iron	SW3050/SW6010	0.7 mg/kg
lead	SW3050/SW6010	4.2 mg/kg
magnesium	SW3050/SW6010	3.0 mg/kg
manganese	SW3050/SW6010	0.2 mg/kg
molybdium	SW3050/SW6010	0.8 mg/kg
nickel	SW3050/SW6010	1.5 mg/kg
potassium	SW3050/SW6010	Determine at time of analysis.
silica	SW3050/SW6010	5.8 mg/kg
silver	SW3050/SW6010	0.7 mg/kg
sodium	SW3050/SW6010	2.9 mg/kg
thallium	SW3050/SW6010	4.0 mg/kg
vanadium	SW3050/SW6010	0.8 mg/kg
zinc	SW3050/SW6010	0.2 mg/kg
Conductance - water	E120.1	-
pH - water	E150.1	-

Total Dissolved Solids (TDS) - water	E160.1	10 mg/L
Temperature - water	E170.1	-
EP Toxicity - soil	SW1310 Extraction & Analytical	b

Notes:

[a]Detection limit as specified by the applicable EPA or Standard Method; report as mg/L for water samples and mg/kg for soil samples.

b

Metal	mg/L of Leaching Solution
As	0.002
Ba	0.1
Cd	0.005
Cr	0.05
Pb	0.1
Hg	0.0002
Se	0.002
Ag	0.01

Additional Notes:

1. VOC (VOC means volatile organic chemicals as defined by EPA in Federal Register) refers to analysis for both Aromatic Volatile Organics and Halogenated Volatile Organics.

2. "A" Methods - Standard Methods for the Examination of Water and Wastewater, 16th Edition (1985).

3. "E" Methods - U.S. Environmental Protection Agency

4. "SW" Methods - Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 2nd Edition (USEPA, 1984)

5. For soil samples, report results as mg/kg of dry soil. Report moisture content for each soil sample.

TABLE 4

List of Sites Requiring Phase II, Stage 2 Work

Fire Training Area 3
Landfill No. 4
Landfill No. 1
Landfill No. 3
DPDO Waste Storage Area
Coal Pile

TABLE 5

Analytical Requirements for Water Samples at the Fire Training Area 3

Petroleum Hydrocarbons	E418.1
Aromatic Volatile Organics	~~SW5030/SW8020~~ E602
Halogenated Volatile Organics	E601
Lead	E239.2
Specific Conductance	E120.1
pH	E150.1
Temperature	E170.1

TABLE 6

Analytical Requirements for Water Samples at Landfill 4, Landfill 1 and Landfill 3

Petroleum Hydrocarbons	E418.1
Aromatic Volatile Organics	~~SW5030/SW8020~~ E602
Halogenated Volatile Organics	E601
13 Priority Pollutant Metals	E200.7
	E206.2
	E245.1
	E270.2
Extractable Priority Pollutants	E625
Specific Conductance	E120.1
pH	E150.1
Temperature	E170.1
Total Dissolved Solids (TDS)	E160.1
Common Anions	A429

TABLE 7

Analytical Requirements for Sediment Samples at Landfill 4

Petroleum Hydrocarbons	SW3550/E418.1
Aromatic Volatile Organics	~~SW5030/SW8020~~ E602
Halogenated Volatile Organics	~~SW5030/SW8010~~ E601
13 Priority Pollutant Metals	SW3050/SW6010
	SW3050/SW7060
	SW7471
	SW3050/SW7740
Extractable Priority Pollutants	SW3550/~~SW8270~~ /E625

TABLE 8

Analytical Requirements for Water Samples at the DPDO Waste Storage Area

Petroleum Hydrocarbons	E418.1
Aromatic Volatile Organics	~~SW5030/SW8020~~ E602
Halogenated Volatile Organics	E601
Non-Halogenated Volatile Organics	SW5030/SW8015
13 Priority Pollutant Metals	E200.7
	E206.2
	E245.1
	E270.2
Extractable Priority Pollutants	E625
Total Cyanide	~~A412D~~ E335.2
Specific Conductance	E120.1
pH	E150.1
Temperature	E170.1
Total Dissolved Solids (TDS)	E160.1
Common Anions	A429
Alkalinity (Separately report carbonate, bicarbonate and hydroxide alkalinity)	A403

TABLE 9

Analytical Requirements for Soil and Sediment Samples at the DPDO Waste Storage Area

Petroleum Hydrocarbons	SW3550/E418.1
Aromatic Volatile Organics	~~SW5030/SW8020~~ E602
Halogenated Volatile Organics	~~SW5030/SW8010~~ E601
Non-Halogenated Volatile Organics	SW5030/SW8015
13 Priority Pollutant Metals	SW3050/SW6010
	SW3050/SW7060
	SW7471
	SW3050/SW7740
Extractable Priority Pollutants	SW3550/~~SW8270~~ / E625
Total Cyanide	~~A412D~~ E335.2

TABLE 10

Analytical Requirements for Soil Samples at the Coal Pile, Building 2700 and Background Sample

Total Metals Screen	SW3050/SW6010

APPENDIX B

BIOGRAPHIES OF KEY PERSONNEL

W. JOSEPH ALEXANDER

Education

B.S., Geology, East Carolina University, 1972
M.S., Geology, Northern Arizona University, 1974
(Hydrogeology/Engineering Geology Emphasis)

Registration

Registered Geologist - State of Georgia (No. 559)

Experience

1984 to date. Research Triangle Institute. Manager of Hydrogeology Department, Center for Environmental Measurements, Environmental Sciences and Engineering Unit. Technical and administrative responsibilities as leader of hydrogeology and support staff conducting research and applied hydrogeological projects. Currently Task Leader for ground-water aspects of pilot study for EPA National Pesticide Survey. Responsibilities include determining the ground-water vulnerability of six counties and development of sampling protocol for domestic and community well systems. Currently Task Leader for Stage 2 hydrogeologic assessment of five waste disposal sites at one Air Force base. Involved in ground-water contamination and baseline environmental studies for commercial clients. Recently Task Leader on first stage of the EPA's National Pesticide Survey to determine ground-water vulnerability at county levels throughout the United States. Recently Project Leader for Phase II, Stage 1 ground-water contamination studies at several Air Force bases under DoD's Installation Restoration Program. Project Leader on work assignment with EPA's Office of Solid Waste to provide technical support necessary to resolve various hydrogeologic issues used in the development of locational siting guidelines for hazardous waste treatment, storage, and disposal facilities.

1979 to 1984. Law Engineering. Senior Hydrogeologist, Natural Resources and Waste Management Division. Responsible for management of hydrogeological services group. Technical direction of studies dealing with ground-water contamination, remedial measures assessment, and related environmental surveys. Activities largely centered within the chemical, paper, petroleum, and nuclear industries. Ground-water contamination evaluations of landfills, land treatment areas, spill sites, underground storage tanks, and waste pits, ponds, and lagoons. Designed and implemented recovery, containment, and monitoring systems for petroleum products released within a variety of hydrogeologic settings. Conducted aquifer tests and dispersion testing for hydraulic characterization of contaminated sites. Developed data base management systems for interpretation of site hydrogeology and ground-water contaminant distribution. Evaluated effectiveness of ground-water containment/diversion alternative in controlling oxygen demand on stream using two-dimensional computer model. Also responsible for regional aquifer characterization studies and for ground-water supply evaluations.

Experience (Continued)

1977 to 1979. Soil & Material Engineers. Engineering Geologist/ Hydrogeologist, Engineering Department. Responsible for management of a variety of hydrogeological, geotechnical, and engineering geology projects. Evaluation of contaminated ground-water sites and design and implementation of remedial systems. Other types of projects included subsurface evaluation of dam sites, foundation engineering, industrial site development, and the evaluation of waste disposal sites.

1974 to 1977. Law Engineering. Staff Hydrogeologist, Water Resources Department. Responsibilities included preparation of ground-water geology sections of Preliminary Safety Analysis Reports for nuclear power and fuel reprocessing plants, feasibility studies for ground-water supplies and evaporation-percolation ponds, and ground-water investigations for pollution control facilities and coal-gasification plants.

1972 to 1974. Department of Geology, Northern Arizona University. Graduate Teaching Assistant. Responsibilities included instructing courses and leading related field trips for engineering geology, physical geology, and physical science laboratory courses. Worked part time for registered hydrogeologist in conducting aquifer tests in municipal well fields, performing geologic mapping, and conducting geomagnetic investigations in northern Arizona.

Professional Associations

International Association of Hydrogeologists
Association of Ground-Water Scientists and Engineers
Association of Engineering Geologists

Selected Publications

Alexander and Liddle, "Ground-Water Vulnrability Assessment in Support of the First Stage of the National Pesticide Survey," Proceedings of the Agricultural Impacts on Ground Water Conference, Omaha, Nebraska, 1986.

Alexander, Miller, and Seymour, "Mitigation of Subsurface Contamination by Hydrocarbons," National Conference on Management of Uncontrolled Hazardous Waste Sites, 1982.

Miller and Alexander, "Geologic Aspects of Waste Disposal Site Evaluations," Association of Engineering Geologists, Bulletin Vol. XVIII, No. 3, 1981.

Miller, Schlecht, and Alexander, "Groundwater Assessments for Corporate Planning," Abstract, Water Pollution Control Federation, Detroit, 1981.

Alexander, "Measurements of Oxygen-Related Parameters in a Shallow Aquifer System." Abstract, Presented to the National Water Well Association, Las Vegas, 1980.

Alexander, "Geology and Geomagnetics of West Flagstaff, Conconino County, Arizona," Geological Society of America Abstracts, Vol. 6, No. 5, 1974.

Alexander, as participant with others, "Pollution Studies of Tar River Tributaries on the North Carolina Coastal Plain," Report Number GY-9181, National Science Foundation, 1971.

Selected RTI Reports

Alexander and Winters, "Results of Reconnaissance Survey to Evaluate Low Ground-Water Levels in Vicinity of Waste-Treatment Facility." Report prepared under commercial contract 432N-3665, 1986.

Alexander, Liddle, Mason, and Yeager, "Ground-Water Vulnerability Assessment in Support of the First Stage of the National Pesticide Survey." Report under EPA Contract No. 68-01-6646, 1986.

Alexander, Lehr, and Aller, "Training Manual for Using DRASTIC Hydrogeologic Factors in Conducting a National Ground-Water Vulnerability Assessment." Draft Report Under EPA Contract No. 68-01-6646, 1985.

Alexander, Truesdale, and Liddle, "Technical Considerations for Defining the Protectiveness of Various Locational Settings of Hazardous Waste Treatment, Storage and Disposal Facilities." Draft Report under EPA Contract No. 68-03-3149-1-4, 1985.

Winters and Alexander, "Possible Explanations for the Occurrence of Elevated Ammonia Concentrations in Shallow Ground-Water Systems." Report Prepared under Commercial Contract 432T-3045, 1985.

Alexander and Truesdale, "Estimating Ground-Water Velocities and Time of Travel at Treatment, Storage, and Disposal Facilities." Draft Report under EPA Contract No. 68-03-3149-1-4, 1984.

Alexander and Truesdale, "Characterization of Vertical Gradients with Consideration for Measurements at Treatment, Storage, and Disposal Facilities." Draft Report under EPA Contract No. 68-03-3149-1-4, 1984.

Alexander and Truesdale, "The Potential Application of Environmental Isotopes in Hydrogeologic Investigations of Treatment, Storage, and Disposal Facilities." Draft Report under EPA Contract No. 68-03-3149-1-4, 1984.

Alexander, "The Relationship Between Water-Table Slope and Hydraulic Gradient with Considerations for Measuring Representative Hydraulic Gradients at Treatment, Storage, and Disposal Facilities." Draft Report under EPA Contract No. 68-03-3149-1-4, 1984.

Alexander, "Technical Issues Regarding Variable Density Fluids with Considerations for Ground-Water Monitoring at Treatment, Storage, and Disposal Facilities." Draft Report under EPA Contract No. 68-03-3149-1-4, 1984.

Alexander and Liddle, "Installation Restoration Program-Phase II: Confirmation/Quantification Stage 1, Shaw Air Force Base, South Carolina." Draft Report under DoD Contract No. F33615-83-D-4010, 1984.

May 1987

STEVEN L. WINTERS

Education

B.S., Geology, Indiana University, 1981
M.S., Hydrogeology, University of Waterloo, 1984
(Synthetic Organic Solute Transport in Groundwater)

Experience

December 1985 to date. Research Triangle Institute. Research Hydrogeologist, Hydrogeology Department, Center for Environmental Measurements, Environmental Sciences and Engineering Unit. Principal activity has been project hydrogeologist on soil, surface water and ground-water investigations at the Seymour Johnson Air Force Base, Goldsboro, North Carolina under the Air Force Installation Restoration Project. Other projects have been to assist in the development and validation of statistical techniques to aid in the characterization of hazardous waste sites, help design column experiments to evaluate EPA's Toxicity Characteristic Leaching Procedure, provide geologic and hydrogeologic support in the development of a natural-gas reservoir simulation numerical model, survey current underground storage tank leak detection methods, assess the general transport characteristics of gasoline constituents in ground water and assist in the design and implementation of seepage meter surveys in the North Carolina coastal plain. Topics of major document reviews have included the applicability of using generic ground-water transport modeling to regulate hazardous waste disposal practices, ground freezing as a method of contaminant containment, and a large-scale lab study to estimate earthen liner integrity in the field.

1984 to November 1985. Woodward-Clyde Consultants. Senior Staff Hydrogeologist, Water Resources Group. Served as Project Hydrogeologist for two EPA Superfund projects in northern California and Washington. Tasks included the design and implementation of ground-water monitoring networks, soil and water sampling programs, and contaminant transport modeling. Also assisted the Water Resources and Geotechnical staff in assessing organic contaminant migration potential in ground waters contaminated by leaking storage tanks or surface spills in Silicon Valley and wood-preservative plants in northern California.

1981 to 1984. Atomic Energy of Canada, Chalk River Nuclear Laboratories, Chalk River, Ontario. Research Assistant. Principal duties included assistance on research into processes of inorganic and organic solute transport at the ground-water surface-water interface. Also assisted hydrogeologists in research on radio-nuclide transport in the subsurface.

Professional Associations

Association of Ground-Water Scientists and Engineers (NWWA)
American Chemical Society
American Geophysical Union

Selected Publications and Reports

S. M. Harkins, R. S. Truesdale, R. Hill, and S. L. Winters. "U.S. Production of Manufactured Gases: Assessment of Past Disposal Practices (Draft)." Report under EPA contract No. 68-01-6826, 1986.

S. L. Winters. "Database Aquisition for the Development of Statistical Methods for Characterizing Ground-Water Contamination at CERCLA Hazardous Waste Site." Report under EPA Contract No. 68-01-6826, 1986.

S. L. Winters and D. R. Lee. "In Situ Retardation of Trace Organics in Groundwater Discharge to a Sandy Stream Bed," submitted to Environmental Science and Technology June 28, 1985.

S. L. Winters and D. R. Lee. "In Situ Measurement of Organic Solute Transport Parameters in Groundwater Discharge Environments," EOS, 65 (16): 205 (April 17, 1984). Presented at the spring meeting of the American Geophysical Union, Cincinnati, Ohio. May 14, 1984.

S. L. Winters and D. R. Lee. "Organic Solute in Groundwater Discharge Environments," Proceedings, Second International Conference on Ground-Water Quality Research, Tulsa, Oklahoma, March, 1984, pp. 55-58. National Center for Groundwater Research, Oklahoma State University, Stillwater, OK.

SCOTT A. GUTHRIE

Education

B.S., Geology, Marshall University, 1984
Certificate in Ground-Water Resources, J. Sargeant Reynolds Community College, 1985

Experience

September 1986 to date. Research Triangle Institute. Hydrogeologist, Center for Environmental Measurements, Environmental Sciences and Engineering Unit. Primary activities include supervision of monitoring well installation and ground-water sampling for base installation/ restoration projects for the Air Force, and commercial clients. Involved in the domestic well sampling for the pilot study of EPA's National Pesticide Survey.

July 1985 to September 1986. Handex Corporation. Responsible for permitting, assistance in drilling procedures, sample retrieval, construction and installation of wells, monitoring of ground-water levels and determination of hydrocarbon thicknesses in wells.

December 1984 to July 1985. Self-employed as a geological consultant. Projects included installation of irrigation wells, including soil classification, soil chemistry, stratigraphy, site evaluations, linear trend analysis, well design, pump testing, and submittal of reports to County Health Departments. Another project was installation of supply well for small town, including hydrogeological evaluation and selection of well specifications and well-maintenance program.

Professional Associations

National Water Well Association

May 1987

WILLIAM F. GUTKNECHT

Education

B.S., Chemistry, University of Wisconsin, Milwaukee, Wisconsin, 1964
Ph.D., Analytical Chemistry, Purdue University, Lafayette, Indiana, 1970

Experience

October 1983 to Present. Research Triangle Institute. Manager, Environmental Chemistry Department, Center for Environmental Measurements, Environmental Sciences and Engineering. Technical and administrative management of projects in areas of sample collection, chemical analysis, and precipitation methods development and evaluation, quality control/quality assurance, and analytical support of other Centers and Units within RTI. Project leader for multiyear, multidisciplinary analysis and waste management programs with the DOD Air Force and USEPA.

1980 to October 1983. Research Triangle Institute. Supervisor, Environmental Chemistry Section. Supervised analytical chemists performing collection (sampling), recovery and analysis of source, ambient, aqueous, industrial hygiene and biological samples. Directed research and development of new analytical procedures, especially procedures for characterization (speciation) and quantification of inorganic species. Other areas of scientific interest and activity include trace organic analysis and quality control/quality assurance. Used numerous techniques for measurement of trace levels of elements and molecular species, including atomic absorption spectrometry, colorimetric methods, photon-induced x-ray fluorescence, proton-induced x-ray emission, neutron activation analysis, and photoelectron spectrometry. Used Auger microscopy to characterize particles in lungs and ESCA to characterize tellurium, selenium, and lead particles generated and collected in the laboratory. Developed a new procedure for speciation utilizing a combination of catalysis and gas chromatography for measurement of Fe^{+3}, Cu^{+}, and CN^{-} at the parts-per-billion level. Used gas chromatography and high performance liquid chromatography for analysis of environmental air samples for ambient hydrocarbons, isocyanates, and chlordane. Investigated the limitations of a variety of air sample collection devices including stability of compounds in these devices and percent recovery from them.

1978 to 1980. Research Triangle Institute. Environmental Chemist. Prepared quality assurance plans for various analytical studies including environmental screening and pesticide analysis programs. Prepared inorganic and organic samples for quantitative or performance audits and participated in qualitative or systems audits of various analytical laboratories.

1971 to 1978. Duke University. Assistant Professor, Department of Chemistry. Taught undergraduate courses in general chemistry and instrumental analysis. Taught graduate courses in electrochemistry, trace-element analysis, introductory electronics, and programming and on-line application of micro and minicomputers. Accomplishments in research carried out with graduate students under direction included: (a) development of computer-controlled and real-time, computer-optimized analytical systems; (b) development (with R. L. Walter of Duke University), proton-induced, x-ray emission analysis system and utilization of this system for analysis of numerous biomedical and environmental samples; (c) development of ion-selective electrode systems for the measurement of thiols, sulfite and bromide; and (d) studies of certain trace metals in select physiological systems, e.g., chromium in human blood serum, aluminum in human brain tissue, and cadmium in human lungs.

1970 to 1971. Louisiana State University. New Orleans, Louisiana, Postdoctoral Research Associate with Professor G. G. Guilbault. Development of ion-selective electrodes for the measurement of phosphate; development of enzyme-based ion-selective electrodes for the measurement of select thiols.

1964 to 1970. Purdue University. Graduate Research with Professor S. P. Perone. Development of computer-controlled and real-time, computeroptimized electroanalytical systems.

1963 to 1964. University of Wisconsin. Senior Research with Professor L. W. Bahe. Development and construction of a calorimeter.

Professional and Honorary Associations

Phi Lambda Upsilon
Alpha Chi Sigma
American Chemical Society

Chapters or Sections of Books Published

Electronics Experiments 18-21, "Instrumental Analysis Manual," G. G. Guilbault and L. G. Hargis, Marcel Dekker, Inc., New York, 1970.

Selected Publications

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PETER M. GROHSE

Education

B.S., Chemistry, University of Alabama in Huntsville, Huntsville, Alabama, 1969

Experience

May 1985 to Present. Research Triangle Institute. Section Supervisor for Trace Metals Analysis, Environmental Chemistry Department, Center for Environmental Measurements, Environmental Sciences and Engineering. Coordination of metals analysis and methods development programs.

July 1975 to April 1985. Research Triangle Institute. Chemist, Environmental Chemistry Department, Center for Environmental Measurements, Environmental Sciences and Engineering. Development of an atomic absorption technique for the analysis of trace arsine gas. Development of GC analytical methodology for coal gasification product gases. Development of analytical methodology for trace elements in environmental assessment samples. Development of sampling and analytical methodology for gaseous trace elements resulting from fuel conversion processes. Development of methodology for speciation of gaseous As, Se and Hg from fuel conversion processes. Experienced with source measurement techniques and associated quality assurance guidelines. Development of analytical methodology for the determination of Pb, Se, Te and Pt in industrial hygiene samples. Development of speciation and quantitation techniques for organo metallics utilizing GC-AA and LC-AA interface techniques.

May 1972 to July 1974. University of Alabama in Huntsville. Research Analyst. Water analysis using atomic absorption and colorimetric techniques. Ambient air monitoring using continuous NO_x, O_3, total sulfur monitors and continuous GC of HC's, CO.

February 1972 to May 1972. University of Alabama in Huntsville. Graduate Research Assistant. Worked with high vacuum systems and proportional counters used in outer atmospheric cosmic ray studies.

June 1970 to October 1971. U. S. Army. Light Weapons Infantry. Honorable Discharge.

September 1969 to June 1970. University of Alabama (Tuscaloosa). Graduate Teaching Assistant.

September 1968 to August 1969. University of Alabama in Huntsville. Undergraduate Laboratory Assistant. Synthesis of heterocyclic organic compounds and study of carbonium ions involved in formation of these systems.

Professional and Honorary Associations

American Chemical Society

Selected Publications

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Grohse, P. M., and Gutknecht, W. F., "Electrothermal Atomization, Atomic Absorption Measurement of Organotin Species Using the Graphite Platform." Presented at the American Chemical Society, National Meeting in New York City, New York, September 27, 1981.

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Grohse, P. M., Gutknecht, W. F., and Howard, C. E., "Determination of Nickel Subsulfide in the Presence of Other Nickel Compounds." Presented at the 36th Pittsburgh Conference, New Orleans, Louisiana, February 27, 1985. Also, presented at the EPA National Symposium on Recent Advances in the Measurement of Air Pollutants, Raleigh, North Carolina, May 16, 1985.

BEATRICE M. WILSON

Education

B.S., Medical Technology, Our Lady of the Lake College, San Antonio, Texas, 1961

Experience

October 1985 to Present. Research Triangle Institute. Chemist, Center for Environmental Measurements, Environmental Sciences and Engineering. Prepares environmental samples for analysis using various digestion procedures and performs trace metal analysis of these samples by means of flame or furnace atomic absorption spectometry.

May 1985 to September 1985. North Carolina Department of Human Resources. Environmental Chemist, Health Services Division, Environmental Health Section, Solid and Hazardous Waste Management Branch, Bath Building. Assisted the staff and the regulated community to interpret North Carolina hazardous waste regulations. Provided technical assistance to state and industry for treatment and disposal of hazardous materials resulting from discharges.

January 1977 to May 1985. North Carolina Department of Human Resources. Chemical Analyst I, Health Services Division, Laboratory Section, Environmental Sciences Branch, Bath Building. Prepared solid samples for analysis by using digestion or extraction procedures. Analyzed drinking water and hazardous waste samples for numerous parameters using wet chemistry and automated methods. Automated methods included using an IL flame spectrophotometer, a Perkin-Elmer Zeeman-5000 spectrophotometer with graphite furnace, an 01 TOC analyzer, and a rapid flow analyzer. Entered Laboratory data into computer.

October 1974 to June 1975. University of Virginia. Medical Technologist, Student Health Center. Performed various clinical laboratory tests, such as complete blood counts, throat cultures, sedimentation rates, etc.

April 1965 to May 1966. Sloan-Kettering Institute for Cancer Research. Medical Technologist. Assisted with bone marrow aspirations on leukemia patients. Made, stained, and read bone marrow smears.

October 1963 to January 1965. School of Aerospace Medicine. Medical Technologist, Brooks AFB. Performed various clinical laboratory tests on experimental animals for the purpose of standardization.

June 1961 to October 1963. Nix Memorial Hospital. Medical Technologist. Worked in hematology, blood bank, serology, and histology.

Professional Organizations

American Society of Clinical Pathologists

September 1986

APPENDIX C

INFORMATION PERTAINING TO WATER WELLS LOCATED WITHIN AND ADJACENT TO THE BASE

APPENDIX C

INFORMATION PERTAINING TO WATER WELLS LOCATED WITHIN AND ADJACENT TO THE BASE

TABLE C-1. RECORDS OF WELLS DRILLED IN VICINITY OF SEYMOUR JOHNSON AFB

Well No.	Owner	Depth (ft)	Diameter (in)	Depth of casing (ft)	Water level (ft)	Yield (gal/min)
33	N.C. Hide Co.	246	8	--	--	105
34	Jack Wright	75	6	71	-18	15
35	Dewey Bros.	49	6	25	-25	--
36	ESSO Station E974	98	6	--	--	--
37	Goldsboro Iron and Metal Co.	246	6	141	--	105
38	Edwards' Young Mens Shop	100	6	97	--	15
39	Heilig and Myers	127	6	125	-33	56
40	Pepsi Cola Bottling Co.	100	6	90	--	30
41	B. C. Allen	99	4	31	--	10
42	Ben R. Lewis	86	4	82	-35	15
43	Charles E. Croom	65	4	61	-4	10
*44	Dr. W. Trachtenburg	55	4	51	-20	12
45	State Highway Maintenance yard	113	6	108	--	18
46	E. H. Robbins	207	6	202	-45	60
47	Paul Best	90	6	85	-15	20
48	Central School	101	6	96	--	30
62	County Homes	228	8	174	-20	150
79	Brogden School	77	6	73	-34	15
80	Berry Mitchell	103	4	101	--	5
81	Zeb. Mitchell	70	4	68	--	10
82	Zeb. Mitchell	70	4	68	--	--
83	Herbert Mitchell	68	4	66	--	8
84	Herbert Mitchell	81	4	79	--	8
85	W. P. Hatsell	74	4	72	--	8
86	W. P. Hatsell	69	4	67	--	10
87	J. A. Strader	85	4	83	--	8

-- = Data not available.

NOTES: Modified after Pusey (1960).
Refer to Figure 14 for location of wells.
(Except for #33, which is in slate, all wells are in sand.

*Well located within a one-mile radius of the sites studied in Stage 2.

TABLE C-2. DATA FOR BASE WATER SUPPLY AND SERVICE WELLS

Base well No.	USGS well No.	Drilling contractor	Year drilled	Total depth (ft)	Cased depth (ft)	Screened intervals (ft)	Approximate elevation of static water level (ft above msl)	Pump setting (ft)	Pump capacity (gal/min)	Usage
1-63	Wa-133	--	1973[a]	157	--	75-95;152-157	36	70	250[b]	Inactive
2-60	Wa-134	Carolina Well & Pump	1967[a]	113	79	79-113	35	80	240[b]	Standby
3-64	Wa-135	--	1964	134.5	--	58-73;85-90;123-128	31	50	300	Standby
4-64	Wa-122	Sydnor Hydrodynamics	1960	195	47	47-52;59-64;175-195	36	96	300	Active
5-73	Wa-123	Sydnor Hydrodynamics	1973	114	48	48-68;74-84	24	92	180	Active
6-59		Heater Well Company	1959	110	110	46-50;60-64;73-85	32	75	250	Standby
7-73	Wa-124	Sydnor Hydrodynamics	1973	122	122	62-92	61	90	150	Inactive
8-73	Wa-125	Sydnor Hydrodynamics	1973	124	58	58-78;84-94	56	102	200	Active
9-73	Wa-126	Sydnor Hydrodynamics	1973	115	48	48-58;62-72;75-85	50	42	180	Inactive
9-79		Heater Well Company	1979	113	110	70-95	24	--	150	Active
10-60	Wa-127	Sydnor Hydrodynamics	1959	140	142	110-140	25	112	200	Active
11-60	Wa-128	Sydnor Hydrodynamics	1959	140	70	70-100	17	70	200	Active
12-60		--	1959	158	--	102.05-107.5; 117.5-127.5; 72.5-82.5;92.5-97.5	50	--	200	Dismantled
12-79		Heater Well Company	1979	113	113	78-98	31	--	150	Active
13-73	Wa-129	Sydnor Hydrodynamics	1973	120	70	70-90	26	115	160	Active
14-69	Wa-130	Carolina Well & Pump	1969	186	48	48-63;73-93; 177.5-182.5	42	92	155	Active
14-82		Skipper Well Drilling	1982	190	--	42-82; 180-185	20	104	150	Active
15-71	Wa-133	Sydnor Hydrodynamics	1971	112	45	45-55;65-75	44	102	200	Active
16-73	Wa-132	Sydnor Hydrodynamics	1973	118	56	56-67;72-88	38	102	130	Active
TAC Test Cell Well Building 10328		Sydnor Hydrodynamics	1971	190	178	94-99;104-109; 114-119;148-153; 158-163;168-173	17	105	50	Service
*Hospital Well		(No data on file)								Emergency
Rifle Range Well		(No data on file)								Local
Wells 3, 3B, 5, 5A, 6B, 7, 7A, 8A, and 9		(No data on file)								Dismantled

msl = mean sea level

-- = Data not available.

[a]Date of reconstruction.

[b]Original pump capacity before reconstruction.

NOTE: Modifed from Robison and Mann (1977) and Seymour Johnson AFB documents.

*WELL LOCATED WITHIN A ONE-MILE RADIUS OF THE SITES STUDIED IN STAGE 2

TABLE C-3. WELL CONSTRUCTION RECORD FOR WELL 2351

NORTH CAROLINA DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT
DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH, N.C. 27611, PHONE (919) 733-5083

FOR OFFICE USE ONLY
Quad. No. ______ Serial No. 2351
Lat. ______ Long. ______ Pc ______
Minor Basin ______
Basin Code ______
Header Ent. ______ GW-1 Ent. ______

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR COX DRILLING COMPANY
DRILLER REGISTRATION NUMBER 194

STATE WELL CONSTRUCTION PERMIT NUMBER: ______

1. WELL LOCATION (Show sketch of the location below)
Nearest Town: Goldsboro, NC
Ravenwood Lot #95
(Road, Community, or Subdivision and Lot No.)
County Wayne

2. OWNER Cambridge Builders
ADDRESS 2510 E Ash Street
(Street or Route No.)
Goldsboro, NC 27530
City or Town State Zip Code

3. DATE DRILLED 11-19-85 USE OF WELL Domestic
4. TOTAL DEPTH 40' CUTTINGS COLLECTED ☐ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No
6. STATIC WATER LEVEL 14 FT. ☐ above ☒ below TOP OF CASING.
TOP OF CASING IS 1 FT. ABOVE LAND SURFACE.
7. YIELD (gpm): 10-15 METHOD OF TEST Air
8. WATER ZONES (depth): 20 - 40
9. CHLORINATION: Type HTH Amount 1 Cup

DRILLING LOG

Depth From	Depth To	Formation Description
0	12	Brn Sand
12	18	Lt Brn Clay
18	40	Brn Med Col Sand
		Terminated Drilling @ 40'

If additional space is needed use back of form

10. CASING

	Depth		Diameter	Wall Thickness or Weight/Ft	Material
From	0	To 20 Ft.	2"	Sch 40	PVC
From		To Ft.			
From		To Ft.			

11. GROUT

	Depth		Material	Method
From	0	To 20 Ft.	Cement	Pump
From		To Ft.		

12. SCREEN

	Depth		Diameter	Slot Size	Material
From	20	To 40 Ft.	2 in.	15 in.	PVC
From		To Ft.	in.	in.	
From		To Ft.	in.	in.	

13. GRAVEL PACK

	Depth		Size	Material
From	20	To 40 Ft.	BuckShot	Gravel
From		To Ft.		

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)

RECEIVED
... 1985

14. REMARKS ______

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15 NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CONTRACTOR OR AGENT

GW-1 Revised 11/84

APPENDIX D

TECHNICAL OPERATIONS PLAN

TECHNICAL OPERATIONS PLAN

PHASE II, STAGE 2

INSTALLATION RESTORATION PROGRAM

SEYMOUR JOHNSON AIR FORCE BASE

GOLDSBORO, NORTH CAROLINA

Prepared for

U.S. Air Force Occupational and
Environmental Health Laboratory (OEHL)
Brooks Air Force Base, Texas 78235-5501

October 1986

TECHNICAL OPERATIONS PLAN
PHASE II, STAGE 2
INSTALLATION RESTORATION PROGRAM
SEYMOUR JOHNSON AIR FORCE BASE
GOLDSBORO, NORTH CAROLINA

Prepared for

U.S. Air Force Occupational and
Environmental Health Laboratory (OEHL)
Brooks Air Force Base, Texas 78235-5501

Prepared by

Center for Environmental Measurements
Resarch Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

October 1986

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

FIGURES

TABLE OF CONTENTS (continued)

FIGURES (continued)

TABLES

1.0 INTRODUCTION

1.1 Purpose and Scope of Study

The goals of the Installation Restoration Program (IRP) Phase II investigation at Seymour Johnson Air Force Base (AFB) are to:

- Confirm the presence or absence of contamination resulting from past waste disposal practices at the base;
- Determine (if possible) the extent and magnitude of contamination and the potential for migration of those contaminants in the various environmental media;
- Identify public health and environmental hazards associated with the contaminated media;
- Recommend any additional actions or future environmental monitoring necessary to fully assess the potential for contaminant migration at or from the base.

1.2 Installation Description and History

1.2.1 Location of Seymour Johnson AFB. Seymour Johnson AFB is in Wayne County, North Carolina, just southeast of the City of Goldsboro. The base comprises 3,216 acres of contiguous property. In addition, the Air Force owns or has easements on four additional sites totaling 13 acres located in the immediate vicinity of Seymour Johnson AFB. These sites are primarily used for navigation and communication purposes, and have not been included in this Phase II investigation.

1.2.2 History of Seymour Johnson AFB Seymour Johnson AFB was activated in June 1942, when the War Department approved the establishment of a technical school southeast of Goldsboro. The primary mission was to serve as a Headquarters Technical School, Army Air Force. In 1943, additional missions followed, including the Provisional Overseas Replacement Training Center, preparing officers and enlisted men for overseas duty; and the 326th Fighter Group, providing training for replacement pilots for the P-47 Thunderbolt. In 1944, basic training of P-47 pilots became the primary mission at Seymour Johnson AFB.

At the end of World War II in Europe, Seymour Johnson AFB was designated a Central Assembly Station for processing and training troops being reassigned throughout the continental United States and the Pacific. This function was discontinued in September 1945, and the base became an Army Air Force Separation Center.

In May 1946, Seymour Johnson AFB was deactivated and in 1949 the property was deeded to the City of Goldsboro. Between 1950 and 1953, Piedmont Airlines conducted regular flights into Seymour Johnson Field. Other facilities at the base were leased to private interests for warehousing, temporary residence for a road circus, light manufacturing, family housing, and special presentations.

At the end of 1952, the City of Goldsboro transferred the base to the Federal Government, and shortly thereafter, the U.S. Army Corps of Engineers began construction activities for reopening the base. In 1956, Seymour Johnson AFB was reactivated as a Tactical Air Command base, and during the same year, the 83rd Fighter-Day Wing was assigned to the base. The 83rd Fighter-Day Wing was deactivated in 1957, and the 4th Fighter Group was assigned to the base as the primary, or host, unit. The 4th Fighter Group was later designated the 4th Fighter Wing.

A Strategic Air Command Unit designated the 4241st Strategic Wing was activated at Seymour Johnson in 1958. Activation of the 911th Refueling Squadron took place in early 1959. The 4241st was redesignated the 68th Bomb Wing in 1963.

1.3 Description and History of Individual Sites

Ten sites were identified in the Phase I report as potentially containing hazardous materials resulting from past activities. Five of the sites identified in Phase I were selected by the Air Force and Research Triangle Institute (RTI) for the Phase II, Stage 1 assessment. Two additional sites (the DPDO Waste Storage Site and a suspected JP-4 contamination site) were added for the Phase II, Stage 1 investigation. Two sites studied during the Phase II, Stage 1 investigation (Sites 1 through 5) have been moved to Phase IV (Operations and Remedial Actions) of the IRP Program. The area identified as Site 6 during the Stage 1 investigation has been divided into 3 separate sites for this Stage 2 investigation. The second stage of the Phase II investigation will include two sites identified in the Phase I report, but not selected as part of the Phase II, Stage 1 investigation. These sites include Landfill No. 3 and the Coal Pile.

The following descriptions of the six sites to be studied for the Phase II, Stage 2 investigation are based upon the findings of the Phase I report (Engineering-Science, 1982) and the Phase II Stage 1 report (RTI, 1986). The approximate location of all six sites are shown on Figure 1.

1.3.1 Site 1 - Fire Training Area No. 3. The fire department has operated fire protection training areas on base where fires have been ignited and then extinguished. Fire Training Area No. 3 has been in operation since 1956 and is the major permanent fire training area on base. The facility is located adjacent to a fenced truck yard off an extension to Collier Avenue (Figure 2).

The fire training area is comprised of a diked pit formed on a compacted base. An underdrain system was installed to drain the pit to an underground oil/water separator prior to discharging the water into the storm drainage system. A fuel system was later installed to evenly distribute the fuel within the pit from an adjacent fuel storage tank. Until 1974, the area was used on a monthly basis. After 1974, the frequency of training was reduced to quarterly exercises. Between 1956 and the mid-1970's, contaminated fuels and some combustible waste chemicals were burned in the pit. Beginning in 1976, fire training exercises were conducted using only uncontaminated JP-4. Approximately 500 gallons of fuel were used during a typical training exercise. The area was saturated with water prior to the application of fuel. Protein foams, AFFF, Halon 1211, and dry chemicals were utilized as extinguishing agents from 1956 to the present. Residual fuels were burned prior to draining the pit.

The topography in the immediate vicinity of Fire Training Area No. 3 is fairly level. Beyond the fence located northwest of the site, the land surface slopes to the northwest toward Stoney Creek. One monitoring well (MW-11) was installed approximately southwest of the site during the Phase II, Stage 1 investigation. The purpose of this well was to determine the groundwater quality downgradient of the diked pit (Figure 2).

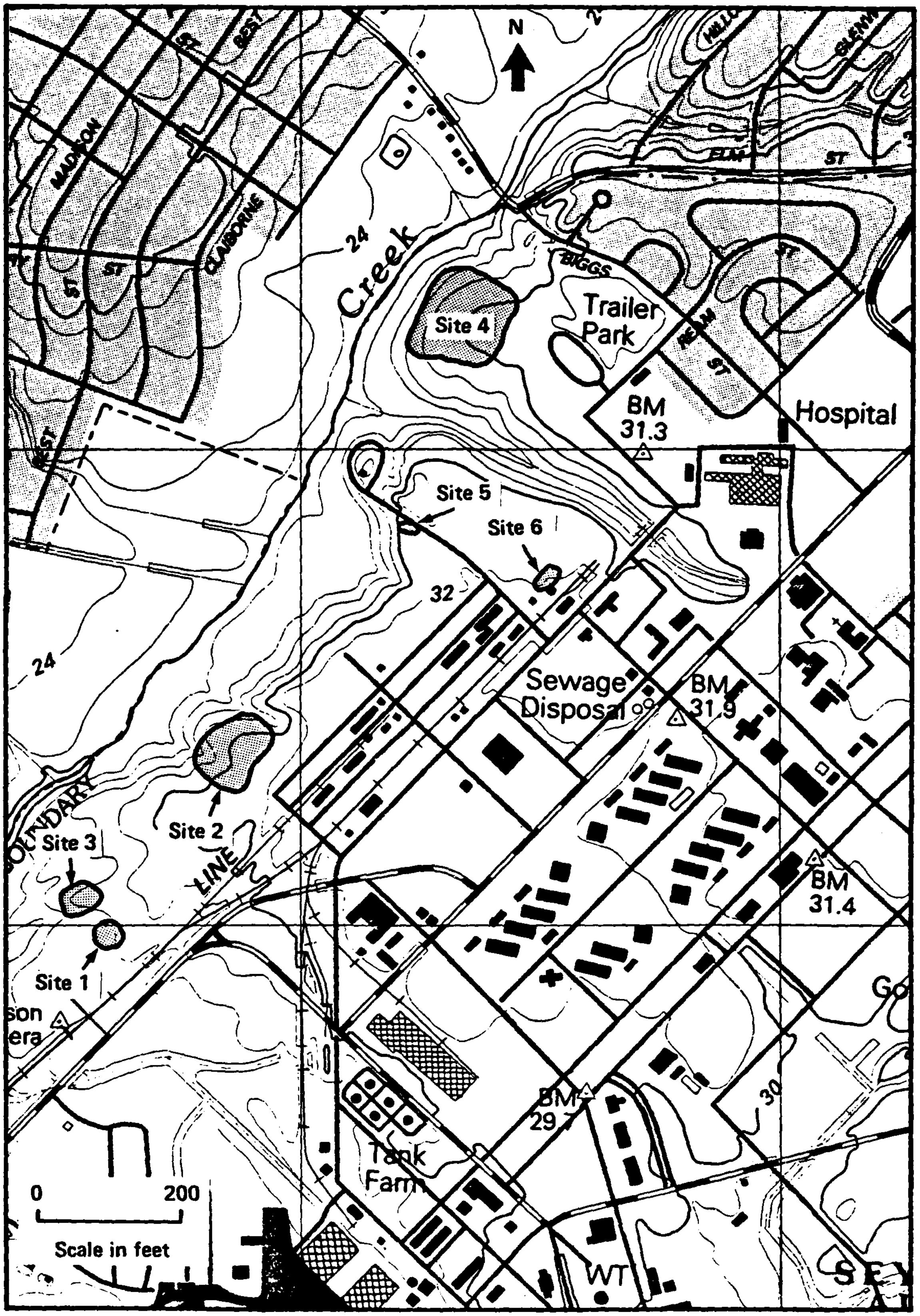


FIGURE 1: Location of Six Sites to be Investigated

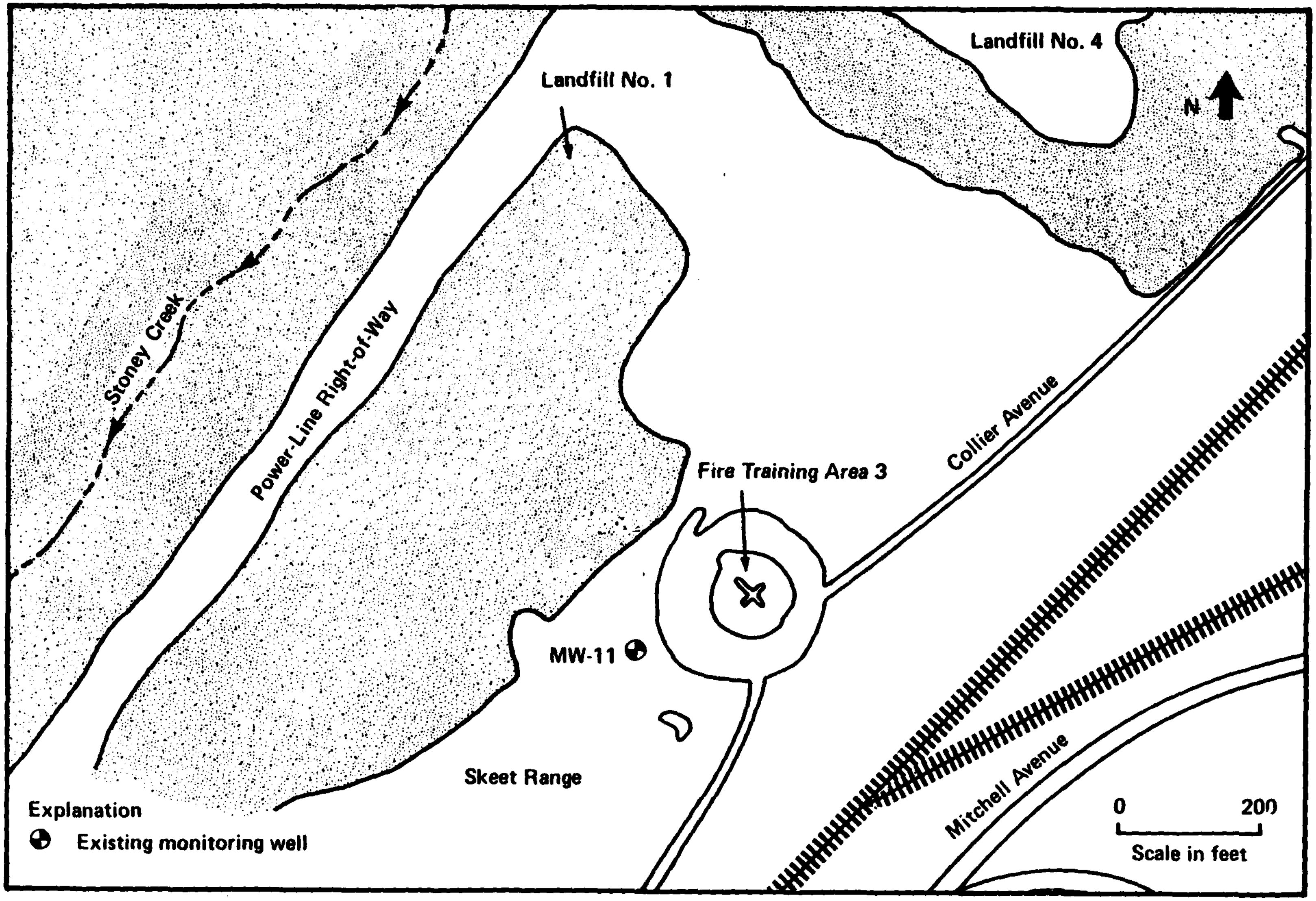


Figure 2. Site 1.

The upper 21 feet of soil beneath the fire training area are predominantly multicolored silty sands with a wide variation in texture. A thin gravel bed was also noted by the driller during the Phase II, Stage 1 investigation at a depth of approximately 15 feet. The sand strata are underlain by a gray sandy silty clay that likely represents the top of the Black Creek formation.

Well MW-11 extends to a depth of approximately 30 feet and is screened just below the sand strata within the Black Creek formation. During development, this well appeared to have a very low yield. Groundwater was measured at a depth of 5.83 feet below land surface in well MW-11 in early April 1984, a rise of just more than a foot since February 1984. This shallow water level is expected to be comparable with water levels in the overlying sand strata considering the proximity of the well screen to those strata. Groundwater flow in the area is assumed to be toward the west or northwest where discharge ultimately occurs in Stoney Creek. The specific conductance of the groundwater obtained from well MW-11 was 50 µmho/cm and the pH was 5.5 in April 1984. No indications of groundwater contamination were noted based on the results of nitrate, oil and grease, total organic carbon, total organic halogen, or phenol analyses performed on samples during the Phase II, Stage 1 investigation.

1.3.2 Site 2 - Landfill No. 4 Landfill No. 4 is located between Collier Avenue and Stoney Creek (Figure 3). The total area of the landfill is approximately 8 acres. The present surface of the landfill is fairly flat with a slope to the northwest. The northwestern limit of the landfill is marked by an abrupt scarp where the landfill extends onto the flat-lying plain near Stoney Creek. The landfill operation began in 1970. Landfill No. 4 was utilized through 1978 for the disposal of general refuse generated on the base with the exception of refuse from the housing area and some miscellaneous industrial chemicals. The landfill was operated in a trench and fill fashion; no burning occurred, and the wastes were covered daily. Trenches were described in the Phase I report as extending from 6 to 7 feet in depth.

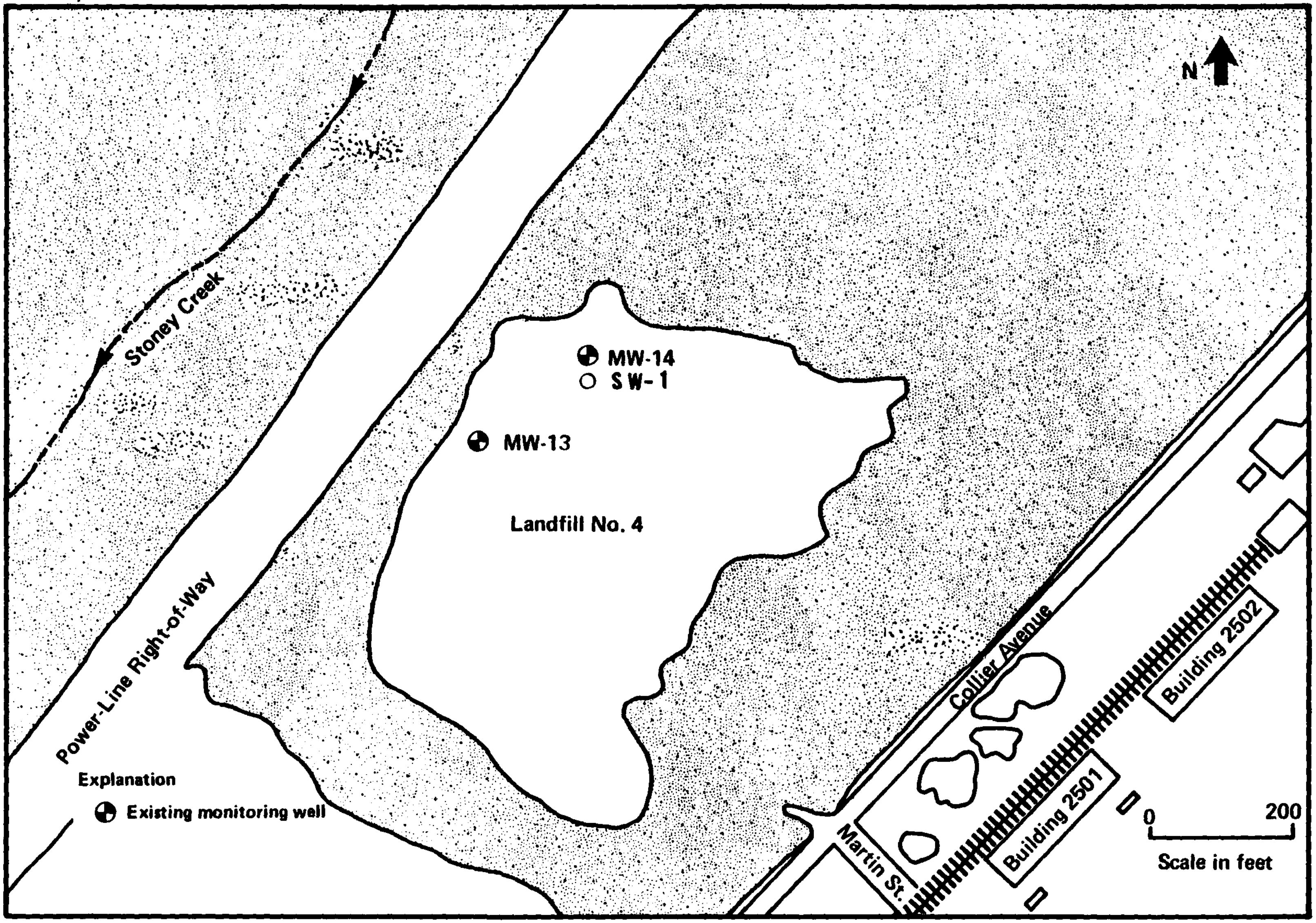


Figure 3. Site 2.

In 1978, the base established a contract for collection and off-base disposal of all refuse generated at Seymour Johnson AFB. The only waste disposed of in the landfill from 1978 to the present consists of rubble from ground maintenance. Trench and fill procedures have been discontinued, and the landfill has been filled along a slope.

Seepage has been observed along the northern toe of the landfill. This leachate was sampled (SW-1), and two monitoring wells (MW-13, MW-14) were installed at the landfill during the Phase II, Stage 1 investigation (Figure 3). Fill material consisting of wood fiber, glass, plastic, paper, and some clayey sand occurs to a depth of approximately 18 feet below the ground surface at Landfill No. 4. A silty sand layer containing well-rounded pebbles occurs beneath the landfill and is underlain by the dark silty clays of the Black Creek formation.

A seepage sample collected from the northern side of Landfill No. 4 during the Phase II, Stage 1 investigation exhibited an elevated specific conductance and relatively high concentrations of lead, cadmium and nickel. Benzene, ethylbenzene, trans-1,2-dichloroethylene, and toluene were also detected in the seepage sample. Groundwater extracted from well MW-13 at the landfill was noted to have a strong hydrogen-sulfide odor and dark gray color during well development. In addition, elevated concentrations of total organic carbon, total organic halogen, and phenol were noted in groundwater samples drawn from well MW-13.

1.3.3 Site 3 - Landfill No. 1 Landfill No. 1 is generally located northwest of Fire Training Area No. 3 and southeast of Stoney Creek (Figure 4). The total area of the site is reportedly about 2.5 acres. Although the actual layout of the landfill is not known at present. A topographic depression exists northwest of the landfill where the northeast-trending power-line right-of-way is present. The ground surface rises further to the northwest of the power lines, and then drops steeply to Stoney Creek.

The site was operated from 1941 through 1946, during the initial activation of the base. During this same period, the base operated a refuse incinerator, and the landfill only received a portion of the waste and refuse generated at the base. Ash from the incinerator was

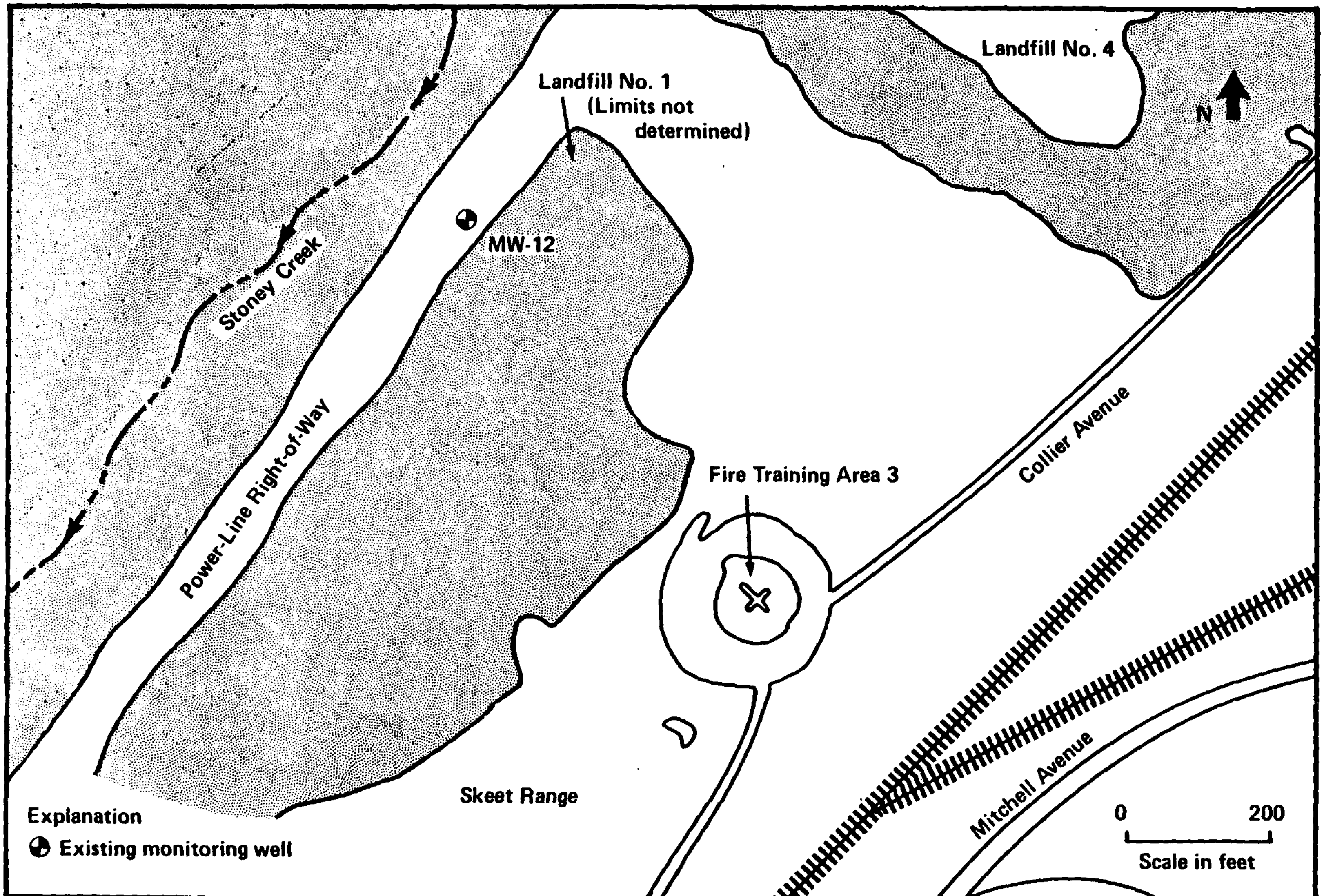


Figure 4. Site 3.

likely disposed of in this landfill along with a small quantity of miscellaneous industrial wastes. Refuse suitable for animal feed was sold to local farmers, and scrap metals were salvaged from the landfill. Since 1946, the landfill has been closed, and the majority of the area has an established vegatative cover. In recent years an excavation training program was conducted in the landfill area. These excavations have uncovered remnants of landfill debris.

One monitoring well (MW-12) was installed between the assumed northern limits of the landfill and Stoney Creek as part of the Phase II, Stage 1 investigation. Rubble fill material was encountered during drilling, indicating some extension of the landfill northwest of the vegetated cover area beneath the existing powerlines. Approximately 5 feet of brown sandy fill material was encountered at well MW-12. Multicolored, occasionally silty, sands were encountered between 5 and 20 feet. Gray silty fine sands, laminated with dark gray silty clays were encountered at a depth of 20 feet and probably represent the top of the Black Creek formation. The depth to groundwater in MW-12 was 9.55 feet below land surface in early April 1984. The direction of groundwater flow from the site is assumed to be to the northwest where discharge occurs into Stoney Creek.

A slightly elevated specific conductance was observed in field measurements conducted on the groundwater sample taken from well MW-12 and also during well development. A pH of 5.55 was measured in the field. Except for a slightly elevated measurement of total organic carbon, there were no other indications of groundwater quality degradation during the Phase II, Stage 1 investigation.

1.3.4 Site 4 - Landfill No. 3: Landfill No. 3 is located along the northern periphery of the base, northwest of the intersection of Biggs Street and Ream Street (Figure 5). The site was operated between 1961 and 1970 and encompasses an area of approximately 15 acres, although the exact limits of the landfill are not known. Soils in the landfill area are reported in the Phase I report as being a sand clay mix. The area of the landfill that is adjacent to Stoney Creek is in a flat-lying flood plain. Landfill operations have included both trench and slope fill practices with trenches ranging from 30 to 35 feet long

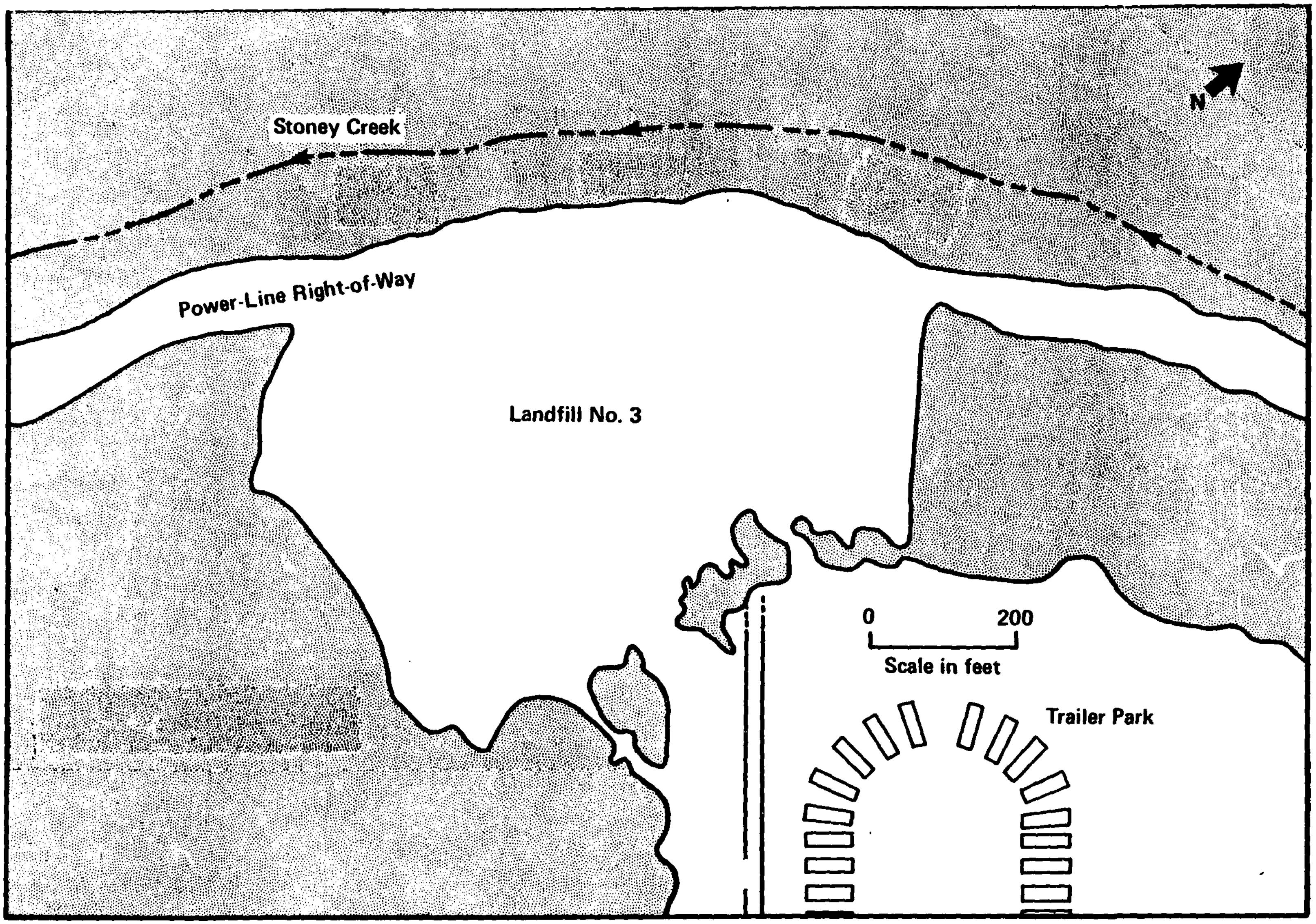


Figure 5. Site 4.

and a maximum depth of 10 feet. Landfilling began in the southwestern portion of the site and extended towards the northeast. The depth of the trenches decreased to 3 to 4 feet as the landfilling operations approached Stoney Creek. The early operational procedures included daily burning and covering, however, during the final stages of landfilling, the burning practice was discontinued. The waste materials disposed in the landfill include general refuse, glass, coal bottom ash and paint residues. Small quantities of spent solvents and other miscellaneous industrial wastes may have been disposed in this landfill. No contaminated fuels and oils were disposed in the landfill. The area was closed and covered with two feet of sandy-loam soil in 1970. No leachate has been observed seeping from this landfill.

1.3.5 Site 5 - DPDO Waste Storage Area: Site 5 is located on the northern section of the base, just south of Fickel Street (Figure 6). The area is enclosed by a fence but is not paved. No known spills have occurred from the hazardous waste tank. There are also no obvious indications of spills on the ground surface. Barrels stored at the site have appeared to be intact. An underground storage tank exists at the site and is used to store commingled POL waste products. Pesticides and waste solvents have also been stored at the site.

The ground surface in the immediate vicinity of the site is relatively flat. There were some indications, noted during the Phase II, Stage 1 investigation, that some of the area had received soil fill. To the west, the site area slopes steeply for a few hundred feet and then reaches the wide, flat-lying plain occupied by Stoney Creek.

Four soil test borings were drilled around the site to depths of 30 feet during the Phase II, Stage 1 investigation. Soil samples were retained for analysis but no monitoring wells were installed. Boring STB-10 was drilled slightly upgrade of the tank in an area assumed to be out of the direct influence of site activities. The remaining three borings were drilled just downgrade of the site. Similar lithologies were encountered in the four borings. The upper 3 to 6 feet of material typically contained a sandy fill with fragments of rock and wood. A bright yellow substance was noted in the fill material from STB-8.

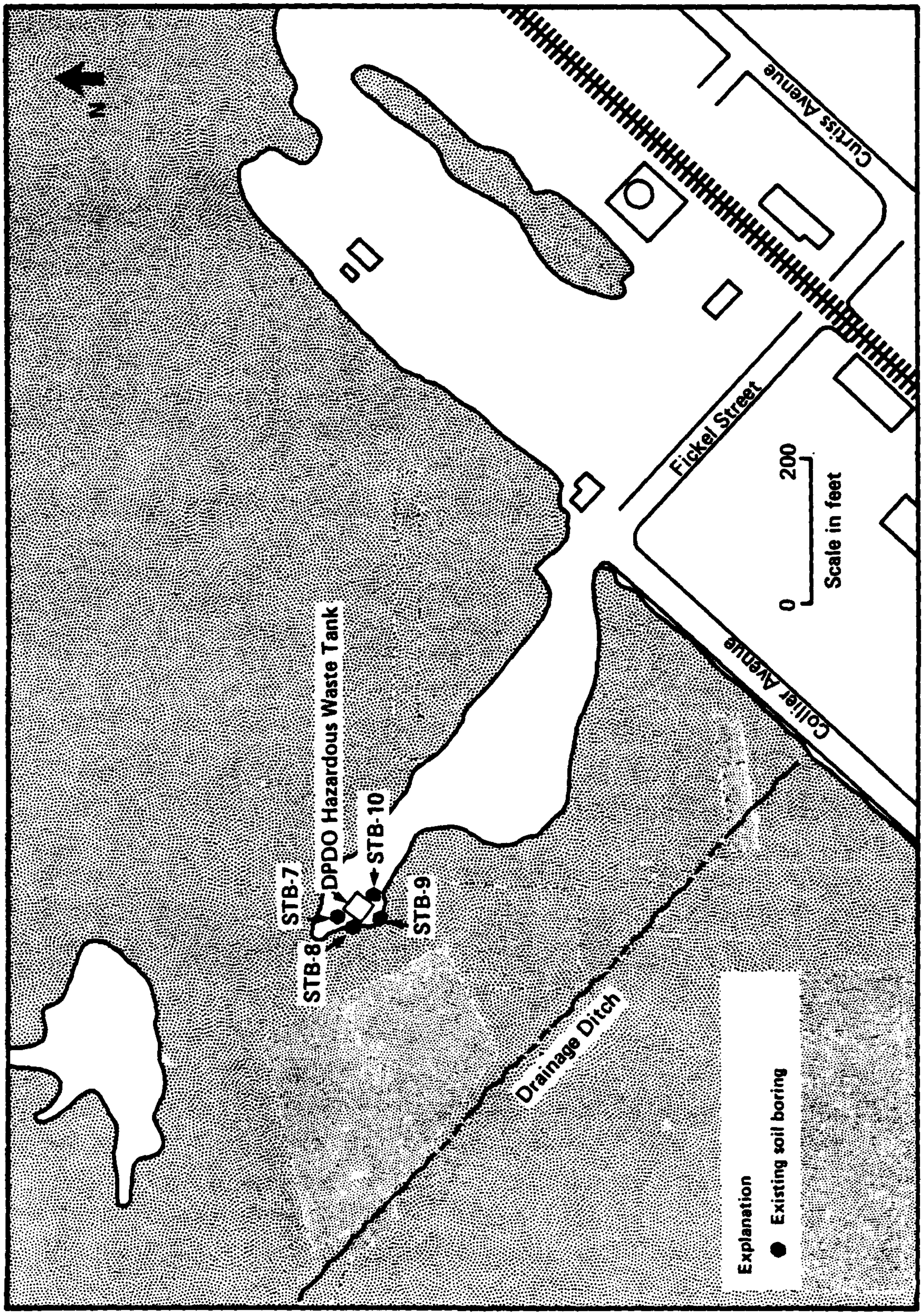


Figure 6. Site 5.

The fill material was underlain by multicolored silty sands that approximately 7 feet thick. Dark gray silty clays laminated with gray silty fine sands were found to underlie the silty sand strata at an average depth of about 10 feet. These laminated sands and clays are believed to represent the top of the Black Creek formation.

The depth to groundwater beneath the site is estimated to be about 10 to 14 feet below land surface. Approximate groundwater elevations measured in the boreholes in February 1984 indicate that flow is to the west toward Stoney Creek.

No pesticides were detected in the soils. In the Phase II, Stage 1 analyses of lead, chromium, and oil and grease in the soils, the results from boring STB-10 appeared to represent background soil conditions for the DPDO area. The concentration of lead did not exceed 3 µg/g, chromium did not exceed 7 µg/g, and oil and grease was below detection limits in boring STB-10. Based on these levels, it was determined the concentrations of lead and chromium measured within the upper 3 feet of soil collected from boring STB-8 were significantly above background levels (676 and 71 µg/g, respectively). These results may be associated with the yellow substance previously noted that was observed in the fill material at this same depth in boring STB-8. The yellow substance may simply be a local concentration of paint in the fill materials. Some of the metals analyzed in borings STB-7 and STB-9 were also elevated two to three times over background conditions as represented at STB-10.

The concentrations of oil and grease measured in the soil samples indicated that the highest values also occurred downgrade of the DPDO tank. The highest concentration of oil and grease (over 9,000 µg/g) was measured in boring STB-9 at a depth of 3 feet.

1.3.6 Site 6 - Coal Pile: A large outdoor area was used from 1956 to 1972 for coal storage. The area is approximately 600 feet long by 200 feet wide and located adjacent to the heat plant (Figure 7). Coal residue is still noticeable in the area. No liners or surface barriers were provided for the coal pile during its active use. The coal pile has been depleted for ten years and only small amounts of coal residues are present on the surface. As indicated in the Phase I report, soil sampling completed in the coal pile area at the time of the Phase I investigation apparently indicated no metals concentrations above background levels.

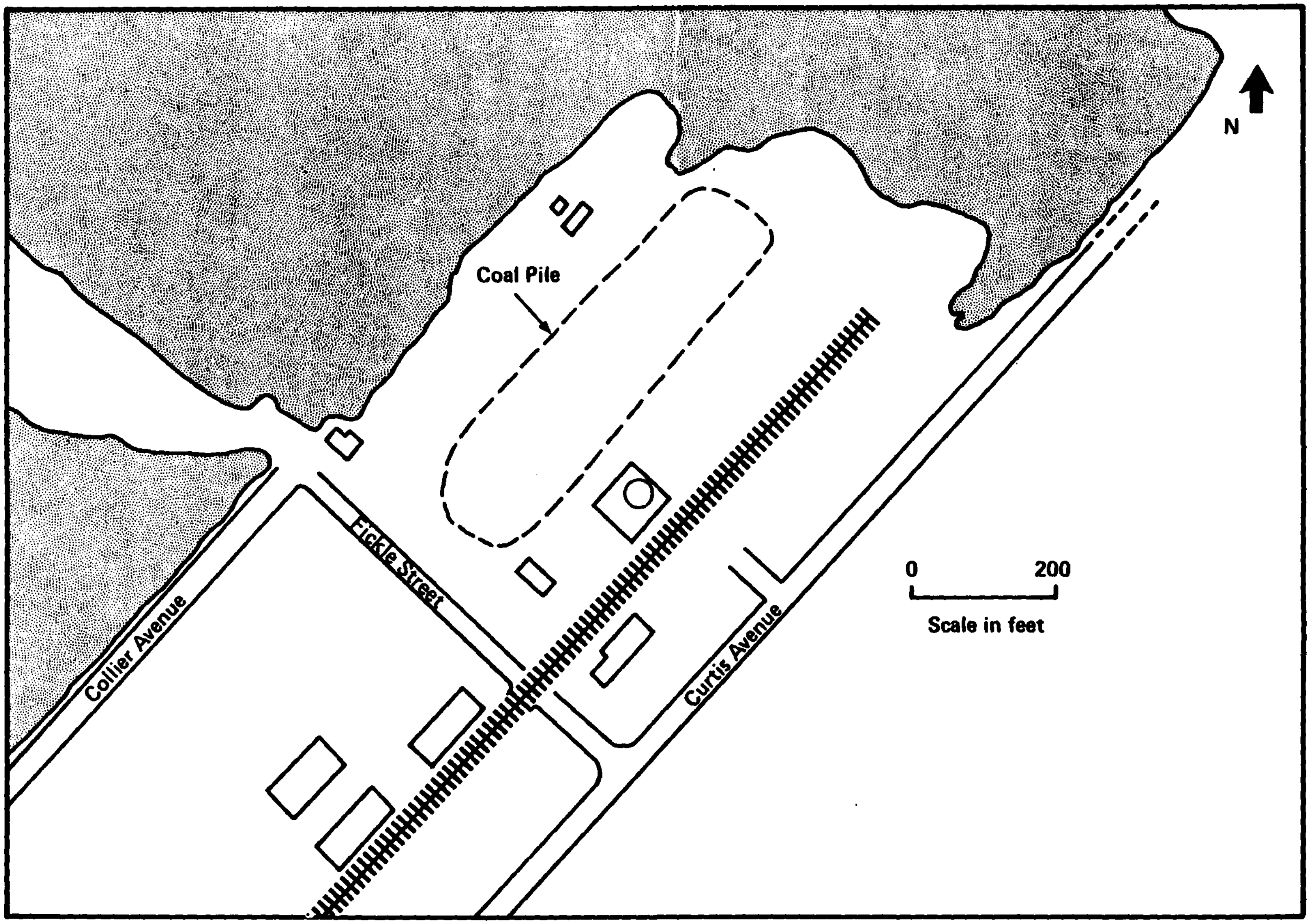


Figure 7. Site 6.

2.0 SITE INVESTIGATION SUMMARY

The primary objective of this investigation is to confirm the presence or absence of contamination at six specific sites at Seymour Johnson Air Force Base. The extent of contamination and the potential for contaminant migration from each of the specified sites will be determined as much as possible within the proposed limits of the investigation. In addition, potential public and environmental health hazards relevant to the media being studied will be identified, and recommendations for any additional investigations needed to complete the contamination assessment will be delineated.

2.1 Overall Facility Investigation

All site investigations will be conducted so as to comply with the Health and Safety Plan designed for the sites (Appendix A).

2.1.1 Literature Review: The first activity of this investigation will involve a comprehensive review of all available literature pertaining to past and present hydrogeologic conditions in the vicinity of the base principally through an examination of well drilling logs for both existing and abandoned wells and any associated aquifer-testing data. This review will include a review of all available topographic, geologic, hydrogeologic and climatic data pertinent to the area within a one-mile radius of the base. Also included will be a collection of data related to existing and abandoned wells and observation wells on or off the base and within a one-mile radius of the sites to be investigated. The literature review will also include the determination of the location and approximate areal extents of the specified sites based on historical and recent aerial photography of the installation.

2.1.2 Site Reconnaissance: Several site reconnaissance surveys will be conducted to establish base contacts, to identify specific health and safety considerations for field activities, to determine the exact locations of the proposed monitoring wells and soil test borings, and to examine the apparent limits of the landfill sites Preliminary surveys will be performed at some sites to determine the current topography in areas where grading and filling activities have taken place and to estimate approximate depth to groundwater. Base personnel will be consulted in advance concerning the location of all proposed drilling activities with respect to underground utilities, site locations, and base activities. No boreholes or monitoring wells will be placed so as to penetrate any of the obvious landfill areas. All exploratory borings and monitoring wells will be placed outside the perimeter of these areas. The base point of contact will be consulted during the reconnaissance to determine whether the proposed monitoring wells should be completed flush with or project above the ground surface.

2.1.3 Drilling and Soil Test Boring All drilling activities will comply with current EPA and North Carolina Natural Resources and Community Development (NCNRCD) requirements. Appropriate permits and abandonment procedures and records for non-water supply wells will be filed for all borings. Drilling will be accomplished using a hollow-stem auger that will be steam-cleaned between borings according to the procedures described in Section 11.1 of this Technical Operation Plan. Ambient air quality will be monitored during all drilling operations with an organic vapor analyzer (with a hydrogen-flame ionization detector), and detailed records of subsurface conditions at each drilling site will be maintained. Soil cuttings from the drilling operations that are suspected of contamination will be containerized and the depth of the suspected contamination will be recorded. A maximum of three composited soil samples will be collected from contaminated soils on the base. These soil samples will be analyzed for EP Toxicity (metals). The base will make provisions for storing and ultimately disposing of the soils suspected of contamination.

2.1.4 Installation and Development of Groundwater Monitoring Wells Groundwater monitoring wells will be installed in such an orientation as to best intercept contaminants that are present and collect groundwater samples that are most representative of the aquifer. Grain-size analyses of soil cuttings from the proposed screened-section horizons may be needed so that proper slot sizes can be selected for the monitoring well screens. As specified in Proposed Order F33615-83-D-4010, all monitoring wells will be screened so as to collect floating contaminants and take into account normal annual water-table fluctuations. Whenever practical, wells will be installed away from areas that are susceptible to frequent flooding recognizing, however, that many of the proposed wells will require installation in geographically recognized flood plain areas. The wells will be designed as to prevent the infiltration of water down the annular space. Details of the proposed monitoring well construction specifications and development procedures are presented in Sections 8.3 and 8.4 of this Technical Operations Plan. Permits for the wells have been obtained from the State of North Carolina (Permit No. 95-0131-WM-0108).

2.2 Investigation of Individual Sites

Six sites have been specified for this investigation. Preliminary studies of four of these sites were conducted during the Phase II, Stage 1 investigation at the base. The additional two sites have been included based on their suspected contamination potential. The actions to be undertaken at these six sites have been outlined in Proposed Order F33615-83-D-4010 (Appendix B).

2.2.1 Site 1 - Fire Training Area No. 3: One existing shallow groundwater monitoring well (MW-11) is located approximately 150 feet downgradient of Site 1 (Figure 8). In addition, three new shallow groundwater monitoring wells will be installed. One shallow upgradient well will be installed to the southeast of the site (MW-40), and two additional shallow downgradient wells (MW-41 and MW-42) will be installed to the west of the site. Groundwater samples will be collected from all new and existing wells according to the procedures detailed in Section 10.0. All groundwater samples from this site will be analyzed for the parameters indicated in Table 1.

2.2.2 Site 2 - Landfill No. 4: Two existing shallow groundwater monitoring wells (MW-13 and MW-14) are located near Landfill No. 4 (Figure 9). Well MW-13 is within the landfill boundary near the northwestern corner of the landfill. Well MW-14 is along the northern edge of the landfill, outside the landfill boundary. In addition, one shallow upgradient well (MW-43) will be installed along the eastern boundary of the landfill, and five shallow downgradient wells (MW-44, MW-45, MW-46, MW-47 and MW-48) will be installed to the west of the site generally between the western landfill boundary and Stoney Creek. One deep downgradient monitoring well (MW-49) will be installed between the western landfill boundary and Stoney Creek. This deep well will be screened in the top most productive layer of the Black Creek aquifer.

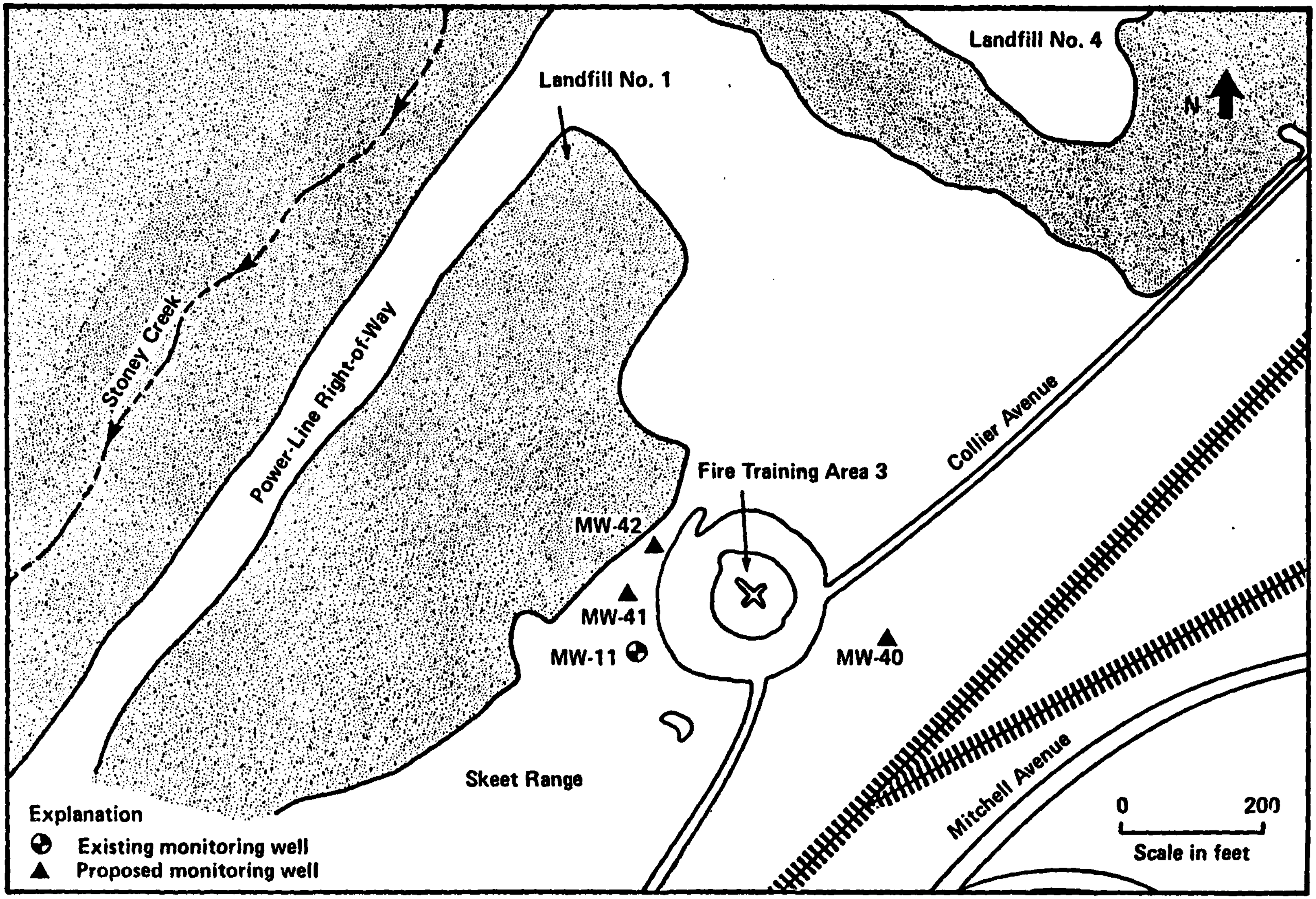


Figure 8. Site 1.

TABLE I

ANALYSES REQUIRED FOR SITE I (FIRE TRAINING AREA NO. 3)

Analytical Parameter	Method	Detection Limit	Existing Well	New Wells		
			MW-11	MW-40	MW-41	MW-42
Petroleum Hydrocarbons						
- Water	E418.1	1 mg/L	x	x	x	x
Aromatic Volatile Organics						
- Water	SW5030/ SW8020	*	x	x	x	x
Halogenated Volatile Organics						
- Water	E601	*	x	x	x	x
Lead						
- Water	E239.2	0.002 mg/L	x	x	x	x
Specific Conductance						
- Water	E120.1	---	x	x	x	x
pH						
- Water	E150.1	---	x	x	x	x
Temperature						
- Water	E170.1	---	x	x	x	x

x Analysis to be done
* Detection limits as specified by the procedure
--- Detection limits dependent on field conditions

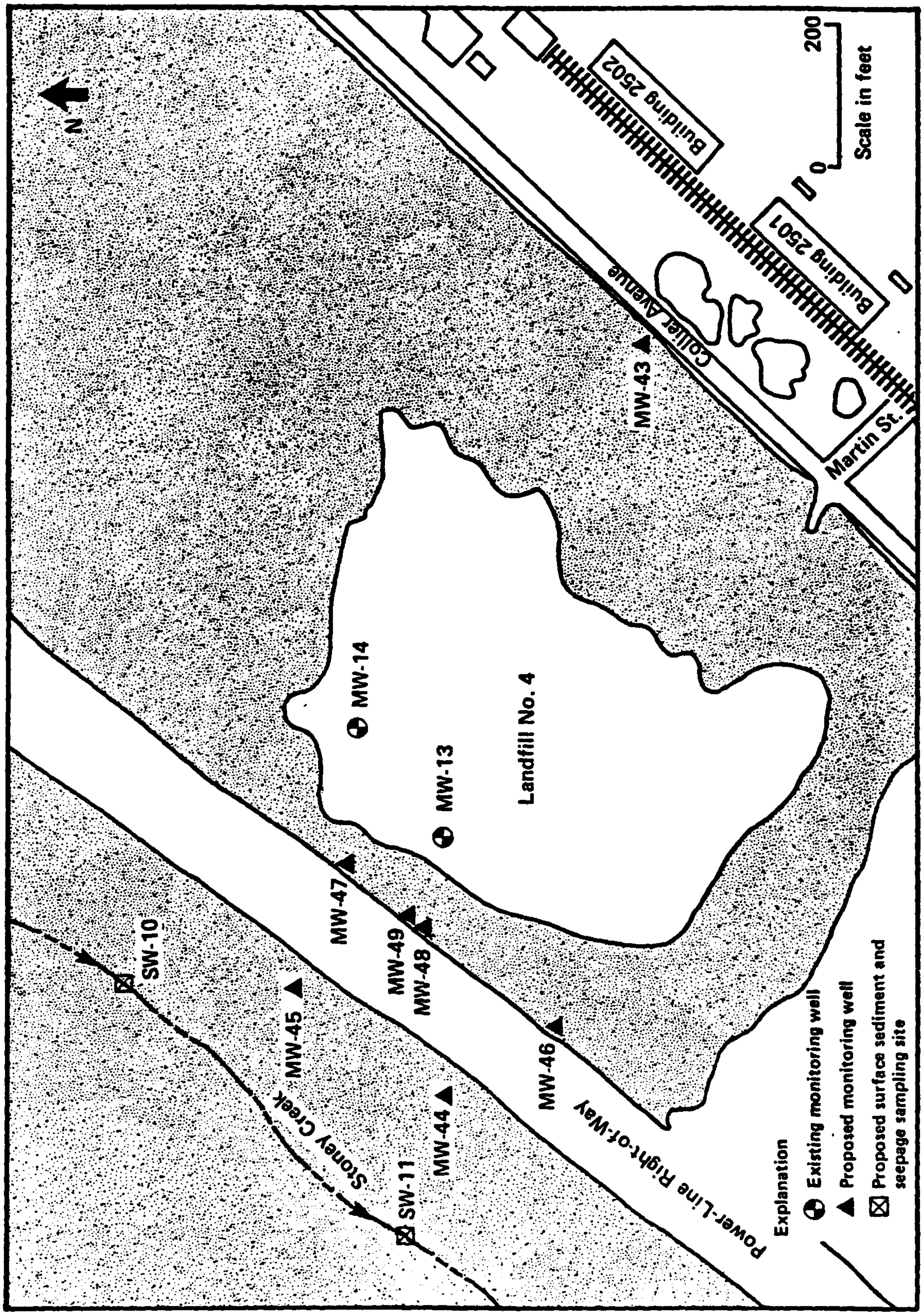


Figure 9. Site 2.

This well is tentatively planned to be immediately adjacent to shallow well MW-48 to facilitate the testing of hydraulic connections between the shallow and deeper aquifers.

Groundwater samples from all new and existing wells at this site will be collected according to the procedures detailed in Section 10.0, and will be analyzed for the parameters indicated in Table 2. If seepage is noted to occur at the land surface, a maximum of two landfill seepage samples will be collected. A maximum of two sediment samples will also be collected from the natural runoff channels found between the landfill and Stoney Creek. These seepage and sediment samples will be analyzed for the parameters indicated in Table 2.

2.2.3 Site 3 - Landfill No. 1: One existing shallow groundwater monitoring well (MW-12) is located to the north (and downgradient) of Landfill No. 1 (Figure 4). One groundwater sample will be collected from this existing well and analyzed for the parameters indicated in Table 3. No new monitoring wells are proposed for this site.

2.2.4 Site 4 - Landfill No. 3 Analysis of conditions at this landfill was not a part of the Phase II, Stage 1 investigation. There are no existing groundwater monitoring wells at this site. Historical aerial photographs of the base will be used to delineate the approximate landfill boundaries. Four shallow groundwater monitoring wells will be installed around the perimeter of the landfill. One monitoring well (MW-50) will be installed along the southeastern landfill boundary on the presumed upgradient side of the landfill (Figure 10). Three shallow downgradient groundwater monitoring wells (MW-51, MW-52, and MW-53) will be installed in the swampy area along the northern boundary of the landfill between Landfill No. 3 and Stoney Creek. Groundwater samples from these four new monitoring wells will be collected according to the procedures detailed in Section 10.0 and analyzed for the parameters indicated in Table 4.

TABLE 2

ANALYSES REQUIRED FOR SITE 2 (LANDFILL 4)

Analytical Parameter	Method	Detection Limit	Existing Wells		New Shallow Wells						New Deep Well	Seepage		Sediment	
			MW-13	MW-14	MW-43	MW-44	MW-45	MW-46	MW-47	MW-48	MW-49	SW-10	SW-11	SD-12	SD-13
Petroleum Hydrocarbons															
- Water	E418.1	1 mg/L	x	x	x	x	x	x	x	x	x	x	x		
- Soil	SW3550/ E418.1	1 mg/kg												x	x
Aromatic Volatile Organics															
- Water	SW5030/ SW8020	*	x	x	x	x	x	x	x	x	x	x	x		
- Soil	SW5030/ SW8020	*												x	x
Halogenated Volatile Organics															
- Water	E601	*	x	x	x	x	x	x	x	x	x	x	x		
- Soil	SW5030/ SW8010	*												x	x
13 Priority Pollutant Metals (Water)															
Arsenic	E206.2	0.001 mg/L	x	x	x	x	x	x	x	x	x	x	x		
Antimony	E200.7	0.032 mg/L	x	x	x	x	x	x	x	x	x	x	x		
Beryllium	"	0.0003 mg/L	x	x	x	x	x	x	x	x	x	x	x		
Cadmium	"	0.004 mg/L	x	x	x	x	x	x	x	x	x	x	x		
Chromium	"	0.007 mg/L	x	x	x	x	x	x	x	x	x	x	x		
Copper	"	0.006 mg/L	x	x	x	x	x	x	x	x	x	x	x		
Lead	"	0.042 mg/L	x	x	x	x	x	x	x	x	x	x	x		
Mercury	E245.1	0.0002 mg/L	x	x	x	x	x	x	x	x	x	x	x		
Nickel	E200.7	0.015 mg/L	x	x	x	x	x	x	x	x	x	x	x		
Selenium	E270.2	0.002 mg/L	x	x	x	x	x	x	x	x	x	x	x		
Silver	E200.7	0.007 mg/L	x	x	x	x	x	x	x	x	x	x	x		
Thallium	"	0.040 mg/L	x	x	x	x	x	x	x	x	x	x	x		
Zinc	"	0.002 mg/L	x	x	x	x	x	x	x	x	x	x	x		

TABLE 2 (continued)

REQUIRED ANALYSES FOR SITE 2 (LANDFILL 4)

Analytical Parameter	Method	Detection Limit	Existing Wells		New Shallow Wells						New Deep Well	Seepage		Sediment	
			MW-13	MW-14	MW-43	MW-44	MW-45	MW-46	MW-47	MW-48	MW-49	SW-10	SW-11	SD-10	SD-11
13 Priority Pollutant Metals (Soil)															
Arsenic	SW3050/ SW7060	0.1 mg/kg												x	x
Antimony	SW3050/ SW6010	3.2 mg/kg												x	x
Beryllium	"	0.03 mg/kg												x	x
Cadmium	"	0.4 mg/kg												x	x
Chromium	"	0.7 mg/kg												x	x
Copper	"	0.6 mg/kg												x	x
Lead	"	4.2 mg/kg												x	x
Mercury	SW7471	0.1 mg/kg												x	x
Nickel	SW3050/ SW6010	1.5 mg/kg												x	x
Selenium	SW3050/ SW7740	0.2 mg/kg												x	x
Silver	SW3050/ SW6010	0.7 mg/kg												x	x
Thallium	"	4.0 mg/kg												x	x
Zinc	"	0.2 mg/kg												x	x
Extractable Priority Pollutants															
- Water	E625	*	x	x	x	x	x	x	x	x	x	x	x		
- Soil	SW3550/ SW8270	*												x	x
Common Anions															
Bromide	A429	0.1 mg/L	x	x	x	x	x	x	x	x	x	x	x		
Chloride	"	0.1 mg/L	x	x	x	x	x	x	x	x	x	x	x		
Fluoride	"	0.05 mg/L	x	x	x	x	x	x	x	x	x	x	x		
Nitrate	"	0.1 mg/L	x	x	x	x	x	x	x	x	x	x	x		
Nitrite	"	0.1 mg/L	x	x	x	x	x	x	x	x	x	x	x		
Phosphate	"	0.1 mg/L	x	x	x	x	x	x	x	x	x	x	x		
Sulfate	"	0.1 mg/L	x	x	x	x	x	x	x	x	x	x	x		

TABLE 2 (continued)

REQUIRED ANALYSES FOR SITE 2 (LANDFILL 4)

Analytical Parameter	Method	Detection Limit	Existing Wells		New Shallow Wells						New Deep Well	Seepage		Sediment	
			MW-13	MW-14	MW-43	MW-44	MW-45	MW-46	MW-47	MW-48	MW-49	SW-10	SW-11	SD-10	SD-11
Specific Conductance															
- Water	E120.1	---	x	x	x	x	x	x	x	x	x	x	x		
pH															
- Water	E150.1	---	x	x	x	x	x	x	x	x	x	x	x		
Total Dissolved Solids															
- Water	E160.1	10 mg/L	x	x	x	x	x	x	x	x	x	x	x		
Temperature															
- Water	E170.1	---	x	x	x	x	x	x	x	x	x	x	x		

x Analysis to be done
* Detection limits as specified by the procedures
--- Detection limits dependent on field conditions

TABLE 3

REQUIRED ANALYSES FOR SITE 3 (LANDFILL No. 1)

Analytical Parameter	Method	Detection Limit	Existing Well
			MW-12
Petroleum Hydrocarbons			
- Water	E418.1	1 mg/L	x
Aromatic Volatile Organics			
- Water	SW5030/ SW8020	*	x
Halogenated Volatile Organics			
- Water	E601	*	x
13 Priority Pollutant Metals (Water)			
Arsenic	E206.2	0.001 mg/L	x
Antimony	E200.7	0.032 mg/L	x
Beryllium	"	0.0003 mg/L	x
Cadmium	"	0.004 mg/L	x
Chromium	"	0.007 mg/L	x
Copper	"	0.006 mg/L	x
Lead	"	0.042 mg/L	x
Mercury	E245.1	0.0002 mg/L	x
Nickel	E200.7	0.015 mg/L	x
Selenium	E270.2	0.002 mg/L	x
Silver	E200.7	0.007 mg/L	x
Thallium	"	0.040 mg/L	x
Zinc	"	0.002 mg/L	x
Extractable Priority Pollutants			
- Water	E625	*	x
Common Anions			
Bromide	A429	0.1 mg/L	x
Chloride	"	0.1 mg/L	x
Fluoride	"	0.05 mg/L	x
Nitrate	"	0.1 mg/L	x
Nitrite	"	0.1 mg/L	x
Phosphate	"	0.1 mg/L	x
Sulfate	"	0.1 mg/L	x
Specific Conductance			
- Water	E120.1	---	x
pH			
- Water	E150.1	---	x
Total Dissolved Solids			
- Water	E160.1	10 mg/L	x
Temperature			
- Water	E170.1	---	x

x Analysis to be done
* Detection limits as specified by the procedures
--- Detection limits dependent on field conditions

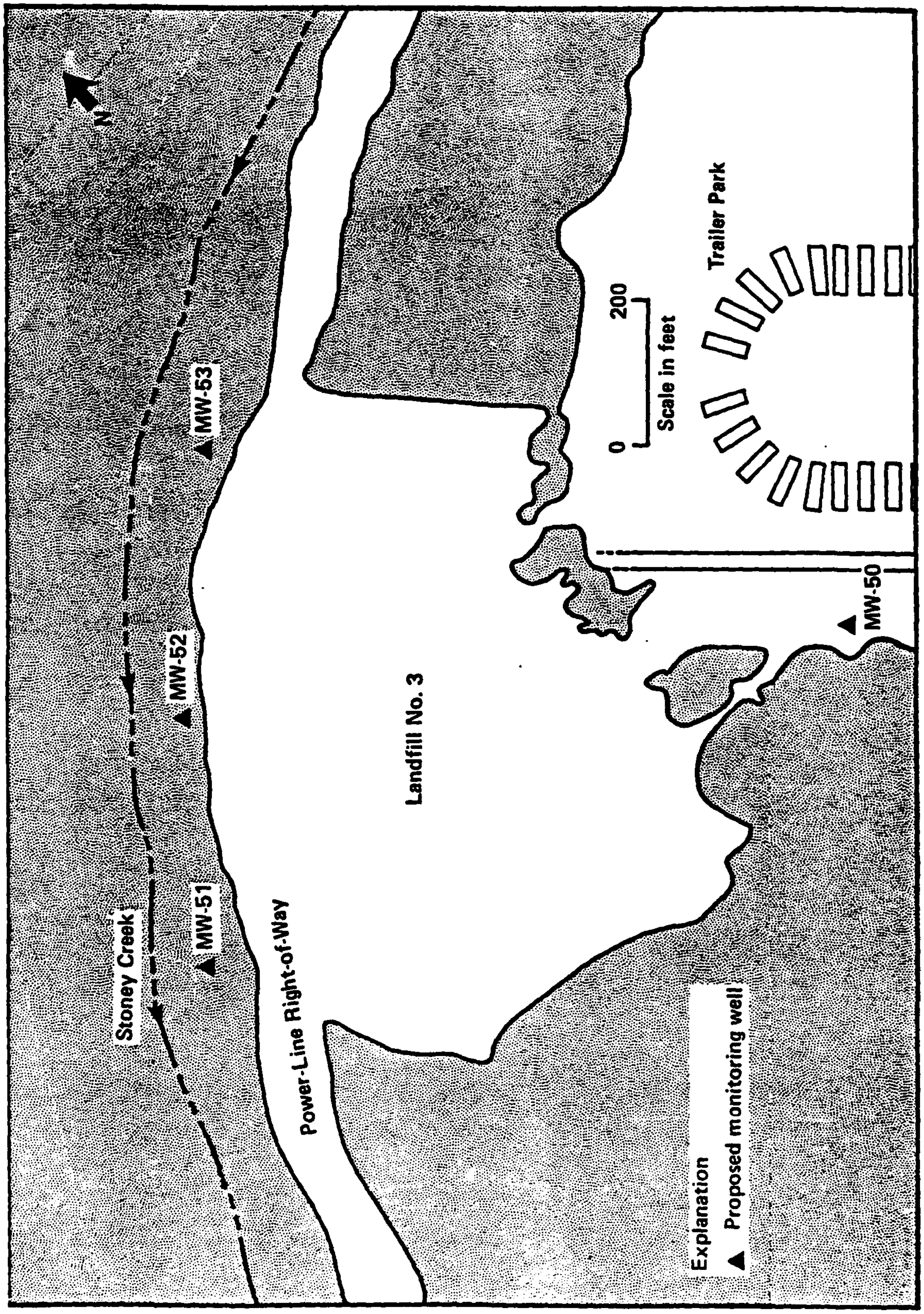


Figure 1a. Site 4.

TABLE 4

REQUIRED ANALYSES FOR SITE 4 (LANDFILL No. 3)

Analytical Parameter	Method	Detection Limit	New Wells			
			MW-50	MW-51	MW-52	MW-53
Petroleum Hydrocarbons						
- Water	E418.1	1 mg/L	x	x	x	x
Aromatic Volatile Organics						
- Water	SW5030/ SW8020	*	x	x	x	x
Halogenated Volatile Organics						
- Water	E601	*	x	x	x	x
13 Priority Pollutant Metals (Water)						
Arsenic	E206.2	0.001 mg/L	x	x	x	x
Antimony	E200.7	0.032 mg/L	x	x	x	x
Beryllium	"	0.0003 mg/L	x	x	x	x
Cadmium	"	0.004 mg/L	x	x	x	x
Chromium	"	0.007 mg/L	x	x	x	x
Copper	"	0.006 mg/L	x	x	x	x
Lead	"	0.042 mg/L	x	x	x	x
Mercury	E245.1	0.0002 mg/L	x	x	x	x
Nickel	E200.7	0.015 mg/L	x	x	x	x
Selenium	E270.2	0.002 mg/L	x	x	x	x
Silver	E200.7	0.007 mg/L	x	x	x	x
Thallium	"	0.040 mg/L	x	x	x	x
Zinc	"	0.002 mg/L	x	x	x	x
Extractable Priority Pollutants						
- Water	E625	*	x			
Common Anions						
Bromide	A429	0.1 mg/L	x	x	x	x
Chloride	"	0.1 mg/L	x	x	x	x
Fluoride	"	0.05 mg/L	x	x	x	x
Nitrate	"	0.1 mg/L	x	x	x	x
Nitrite	"	0.1 mg/L	x	x	x	x
Phosphate	"	0.1 mg/L	x	x	x	x
Sulfate	"	0.1 mg/L	x	x	x	x
Specific Conductance						
- Water	E120.1	---	x	x	x	x
pH						
- Water	E150.1	---	x	x	x	x
Total Dissolved Solids						
- Water	E160.1	10 mg/L	x	x	x	x
Temperature						
- Water	E170.1	---	x	x	x	x

x Analysis to be done
* Detection limits as specified by the procedures
--- Detection limits dependent on field conditions

2.2.5 Site 5 - DPDO Waste Storage Area: Four soil test borings were drilled around the site to depths of 30 feet during the Phase II, Stage 1 investigation. Based on the results of those borings, one downgradient shallow groundwater monitoring well (MW-54) will be installed in the area to the west of the site. The location of well MW-54 will be just beyond the presumed edge of the fill material noted during the Phase II, Stage 1 boring activities at this site (Figure 11). Three additional soil test borings will be drilled in the downgradient area to the west of the storage tank. These borings will be no less than 100 feet from the tank and extend to the water table or to a maximum depth of 30 feet as specified in Proposed Order F33615-83-D-4010. The approximate locations of these proposed borings are depicted in Figure 11. Soil samples will be collected at five-foot intervals or where contamination is suspected from each of the soil borings, and analyzed for the parameters indicated in Table 5. One groundwater sample will be collected from the new shallow well. If possible, two surface water and two sediment samples will be collected from natural channels found between the DPDO waste storage tank and Stoney Creek. These samples will be analyzed for the parameters indicated in Table 5.

2.2.6 Site 6 - Coal Pile: An analysis of conditions at this site was not a part of the Phase II, Stage 1 investigation. There are no existing groundwater monitoring wells at this site. Two shallow soil test borings (SB-58 and SB-59) will be drilled near Building 2700 and the coal pile (Figure 12). The maximum depth of each boring will be 10 feet, with soil samples collected at depths of 2.5, 5 and 10 feet below the ground surface or where contamination is suspected. In addition, one shallow boring (SB-60) will be drilled at a presumed uncontaminated location in the vicinity of Building 2700. The location of this background boring will be as close as possible to the coal pile site to maximize the likelihood of obtaining soil of a comparable composition to that found at Site 6 but far enough to minimize the likelihood of pre-existing soil contamination. All soil samples collected for this site will be analyzed for the parameters indicated in Table 6.

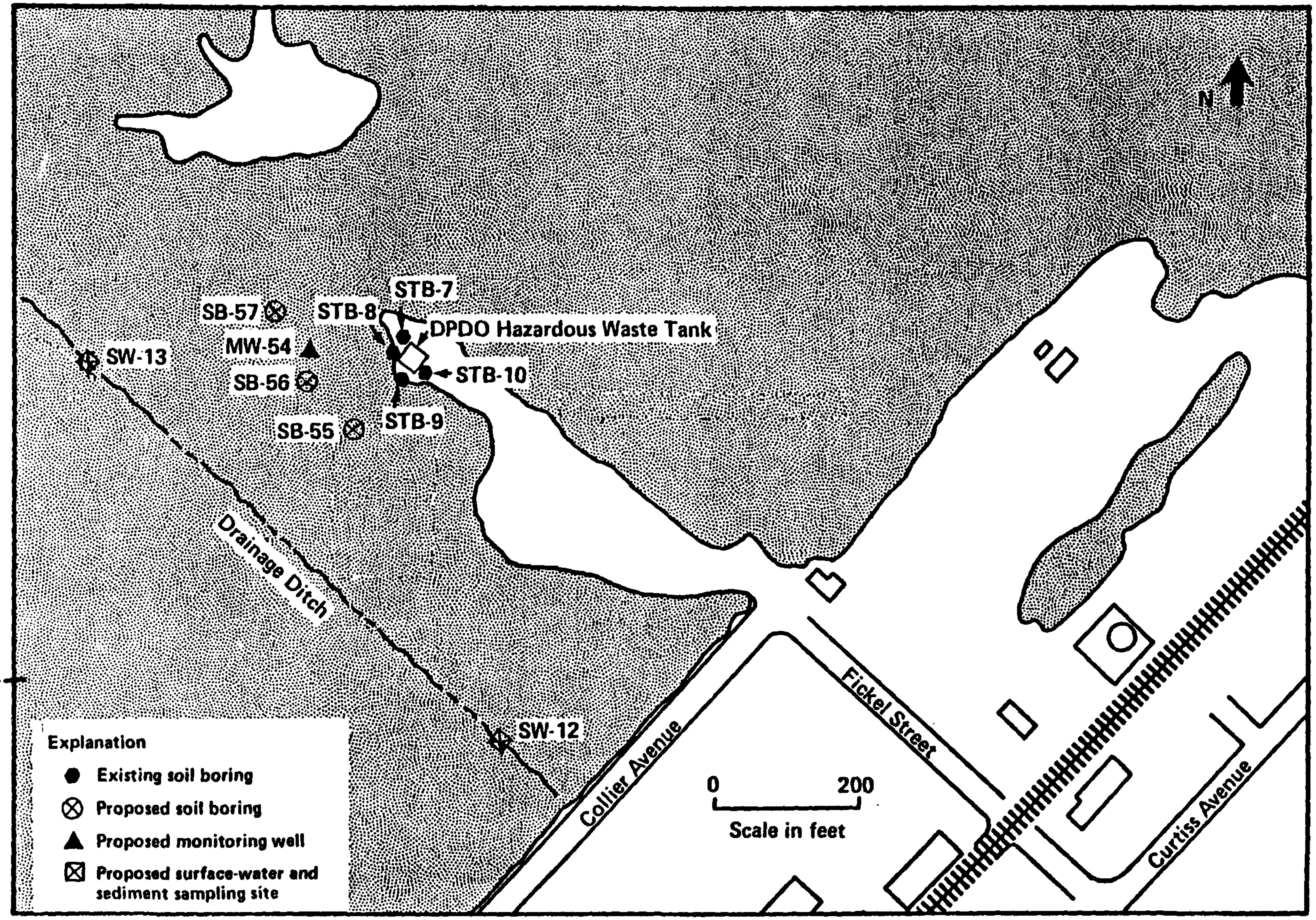


Figure 11. Site 5.

TABLE 5

REQUIRED ANALYSES FOR SITE 5 (DPDO WASTE SITE)

Analytical Parameter	Method	Detection Limit	New Well	Soil Test Borings			Surface Water		Sediment	
			MW-54	SB-55	SB-56	SB-57	SW-12	SW-13	SD-12	SD-13
Petroleum Hydrocarbons										
- Water	E418.1	1 mg/L	x				x	x		
- Soil	SW3550/ E418.1	1 mg/kg		x	x	x			x	x
Aromatic Volatile Organics										
- Water	SW5030/ SW8020	*	x				x	x		
- Soil	SW5030/ SW8020	*		x	x	x			x	x
Halogenated Volatile Organics										
- Water	E601	*	x				x	x		
- Soil	SW5030/ SW8010	*		x	x	x			x	x
Non-Halogenated Volatile Organics										
- Water or Soil	SW5030/ SW8015	*	x	x	x	x	x	x	x	x
13 Priority Pollutant Metals (Water)										
Arsenic	E206.2	0.001 mg/L	x				x	x		
Antimony	E200.7	0.032 mg/L	x				x	x		
Beryllium	"	0.0003 mg/L	x				x	x		
Cadmium	"	0.004 mg/L	x				x	x		
Chromium	"	0.007 mg/L	x				x	x		
Copper	"	0.006 mg/L	x				x	x		
Lead	"	0.042 mg/L	x				x	x		
Mercury	E245.1	0.0002 mg/L	x				x	x		
Nickel	E200.7	0.015 mg/L	x				x	x		
Selenium	E270.2	0.002 mg/L	x				x	x		
Silver	E200.7	0.007 mg/L	x				x	x		
Thallium	"	0.040 mg/L	x				x	x		
Zinc	"	0.002 mg/L	x				x	x		

TABLE 5 (continued)

REQUIRED ANALYSES FOR SITE 5 (DPDO WASTE SITE)

Analytical Parameter	Method	Detection Limit	New Well	Soil Test Borings			Surface Water		Sediment	
			MW-54	SB-55	SB-56	SB-57	SW-12	SW-13	SD-12	SD-13
13 Priority Pollutant Metals (Soil)										
Arsenic	SW3050/ SW7060	0.1 mg/kg		x	x	x			x	x
Antimony	SW3050/ SW6010	3.2 mg/kg		x	x	x			x	x
Beryllium	"	0.03 mg/kg		x	x	x			x	x
Cadmium	"	0.4 mg/kg		x	x	x			x	x
Chromium	"	0.7 mg/kg		x	x	x			x	x
Copper	"	0.6 mg/kg		x	x	x			x	x
Lead	"	4.2 mg/kg		x	x	x			x	x
Mercury	SW7471	0.1 mg/kg		x	x	x			x	x
Nickel	SW3050/ SW6010	1.5 mg/kg		x	x	x			x	x
Selenium	SW3050/ SW7740	0.2 mg/kg		x	x	x			x	x
Silver	SW3050/ SW6010	0.7 mg/kg		x	x	x			x	x
Thallium	"	4.0 mg/kg		x	x	x			x	x
Zinc	"	0.2 mg/kg		x	x	x			x	x
Extractable Priority Pollutants										
- Water	E625	*	x				x	x		
- Soil	SW3550/ SW8270	*		x	x	x			x	x
Common Anions										
Bromide	A429	0.1 mg/L	x				x	x		
Chloride	"	0.1 mg/L	x				x	x		
Fluoride	"	0.05 mg/L	x				x	x		
Nitrate	"	0.1 mg/L	x				x	x		
Nitrite	"	0.1 mg/L	x				x	x		
Phosphate	"	0.1 mg/L	x				x	x		
Sulfate	"	0.1 mg/L	x				x	x		

TABLE 5 (continued)

REQUIRED ANALYSES FOR SITE 5 (DPDO WASTE SITE)

Analytical Parameter	Method	Detection Limit	New Well	Soil Test Borings			Surface Water		Sediment	
			MW-54	SB-55	SB-56	SB-57	SW-12	SW-13	SD-12	SD-13
Specific Conductance										
- Water	E120.1	---	x				x	x		
pH										
- Water	E150.1	---	x				x	x		
Temperature										
- Water	E170.1	---	x				x	x		
Total Dissolved Solids										
- Water	E160.1	10 mg/L	x				x	x		
Total Cyanide										
- Water	A412D	0.020 mg/L	x				x	x		
- Soil	A412D	20 mg/kg		x	x	x			x	x
Alkalinity (Water)										
Bicarbonate	A403	10 mg/L	x				x	x		
Carbonate	A403	10 mg/L	x				x	x		
Hydroxide	A403	10 mg/L	x				x	x		

x Analysis to be done
* Detection limit as specified by the procedure
--- Detection limit dependent on field conditions

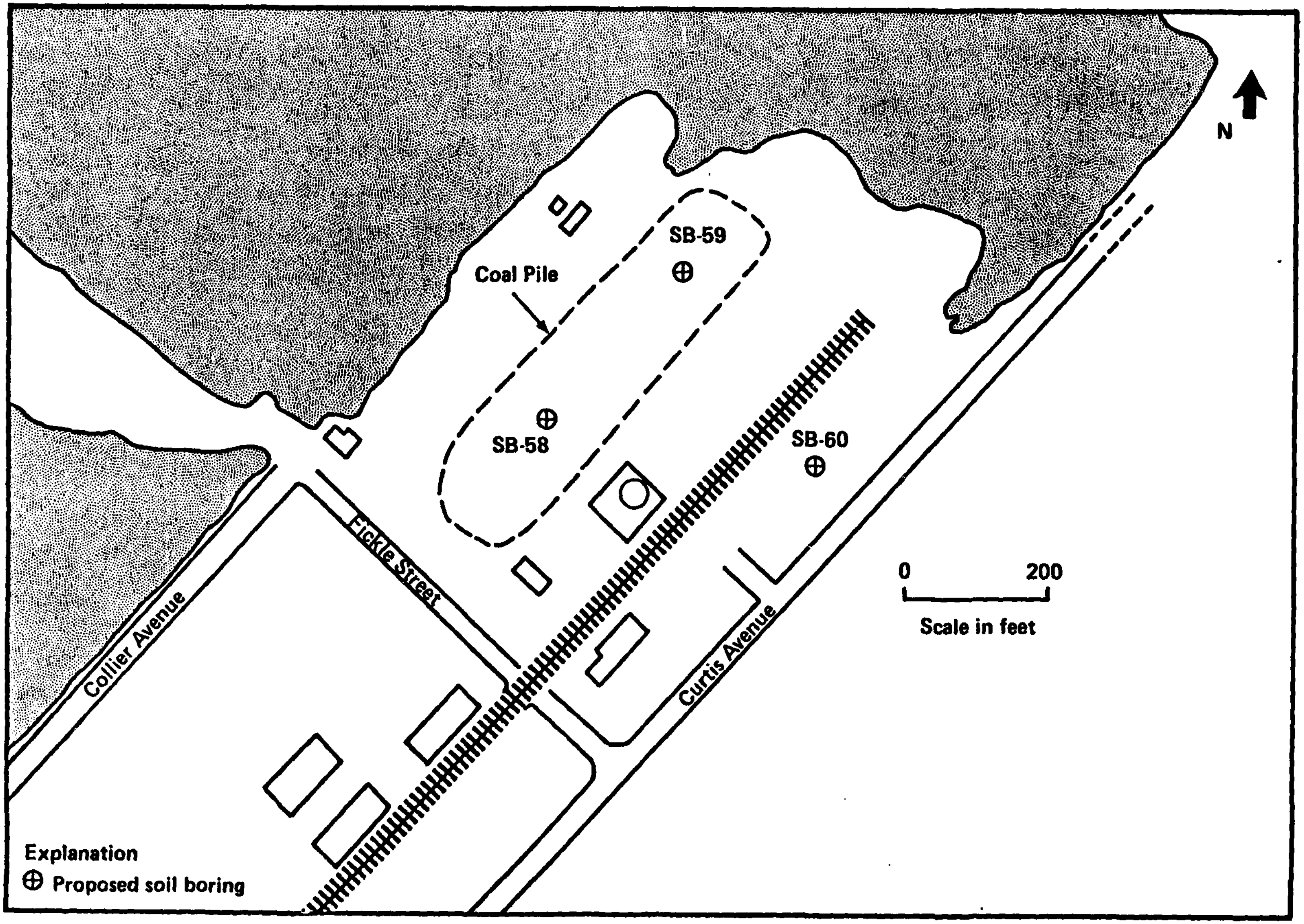


Figure I2. Site 6.

TABLE 6

REQUIRED ANALYSES FOR SITE 6 (COAL PILE)

Analytical Parameter	Method	Detection Limit	Soil Test Borings (3 Samples/Boring)		
			SB-58	SB-59	SB-60
Total Metals Screen (Soil)					
Aluminum	SW3050/ SW6010	4.5 mg/kg	xxx	xxx	xxx
Antimony	"	3.2 mg/kg	xxx	xxx	xxx
Barium	"	0.2 mg/kg	xxx	xxx	xxx
Beryllium	"	0.03 mg/kg	xxx	xxx	xxx
Boron	"	0.5 mg/kg	xxx	xxx	xxx
Cadmium	"	0.4 mg/kg	xxx	xxx	xxx
Calcium	"	1.0 mg/kg	xxx	xxx	xxx
Chromium	"	0.7 mg/kg	xxx	xxx	xxx
Cobalt	"	0.7 mg/kg	xxx	xxx	xxx
Copper	"	0.6 mg/kg	xxx	xxx	xxx
Iron	"	0.7 mg/kg	xxx	xxx	xxx
Lead	"	4.2 mg/kg	xxx	xxx	xxx
Magnesium	"	3.0 mg/kg	xxx	xxx	xxx
Manganese	"	0.2 mg/kg	xxx	xxx	xxx
Molybdenum	"	0.8 mg/kg	xxx	xxx	xxx
Nickel	"	1.5 mg/kg	xxx	xxx	xxx
Potassium	"	*	xxx	xxx	xxx
Silica	"	5.8 mg/kg	xxx	xxx	xxx
Silver	"	0.7 mg/kg	xxx	xxx	xxx
Sodium	"	2.9 mg/kg	xxx	xxx	xxx
Thallium	"	4.0 mg/kg	xxx	xxx	xxx
Vanadium	"	0.8 mg/kg	xxx	xxx	xxx
Zinc	"	0.2 mg/kg	xxx	xxx	xxx

x Analysis to be done
* Determine at the time of analysis

3.0 FIELD SET-UP

The field team will coordinate all field activities with Seymour Johnson Air Force Base personnel. Specially, all base activities will be coordinated with Captain Steve Warren of the USAF Base Bioenvironmental Engineering staff. All work will be conducted at hours approved by base personnel. All field personnel will check in at the main gate each morning and check out at the end of the workday. Work may be conducted at more than one site at a time. RTI personnel will oversee all subcontractor drilling operations. RTI's Project Leader or Site Safety Officer will monitor the specific site conditions and make field operations procedural changes that are deemed necessary to ensure physical safety and technical accuracy.

3.1 Detailed Work Plan

This Technical Operations Plan, in conjunction with the Statement of Work (Appendix B), will serve as a detailed work plan for this investigation.

3.2 Health and Safety Plan

The Health and Safety Plan presented in Appendix A provides guidelines for basic safety procedures and equipment to be utilized by RTI during the course of IRP Phase II investigations at Seymour Johnson AFB, NC. Samples collected during the Phase II, Stage 2 investigation will be environmental water and soil samples, as opposed to hazardous waste samples and the field activities are not expected to require unusual measures of personal protection.

Since this project involves the investigation of more than one site at the Seymour Johnson AFB, an independent Health and Safety Plan was prepared for each site. Detailed plans for each site, including site background information, a site sketch, potential hazards, a site safety work plan, and emergency information are included in Appendix A.

3.3 Subcontractor Information

The drilling activities at all sites will be conducted by Bore and Core, Incorporated of Raleigh, North Carolina. Most off-site chemical analyses will be performed by RTI's Environmental Chemistry Department. Analyses for volatile organic compounds will be conducted by Industrial and Environmental Analysts, Incorporated of Cary, North Carolina. Details of the field team organization and responsibilities are presented in Section 14.

4.0 CALIBRATION OF FIELD EQUIPMENT

All field equipment will be carefully checked and calibrated according to the manufacturer's specifications prior to the start of field activities. The field team will periodically recheck the calibration of the equipment. Specific procedures for the instruments that may be required for use during the investigations at Seymour Johnson Air Force Base include:

<u>Fisher Model 107 pH Meter</u>--Calibration against known standards will be rechecked daily. The buffer solutions will be selected to bracket the anticipated range of pH for the water samples (pH solutions of 4 and 7).

<u>Yellow Springs Instruments (YSI) Model 33 Conductivity Meter</u>--Calibration against known conductivity standards will be rechecked daily.

<u>Foxboro Model 128 Organic Vapor Analyzer and Strip Chart Recorder</u> Calibration will be checked at least daily with reference to a methane-in-air standard. The instrument will be re-calibrated if the reading exceeds $\pm$ 5% error. The instrument will be zeroed daily with clean background air.

<u>Soiltest Model DR-760 and Johnson Water Level Indicators</u>--Check that depth markings are accurate and clearly readable. Check batteries and the response of probes in clean water.

5.0 EQUIPMENT MAINTENANCE

Prior to field activities, all field equipment will be cleaned, moving parts will be oiled if applicable, batteries will be either recharged or replaced, and all instruments will be appropriately calibrated. All equipment will be checked for proper operation prior to the commencement of field operations, and daily in the field. The field equipment will be properly stored and secured on base within RTI's Mobile Environmental Laboratory. A battery charger, marine battery and appropriate cables and clamps, replacement batteries, and calibration standards will be available on site for all equipment. Equipment used by the subcontractors will be maintained by them according to the manufacturer's standards. The decontamination of all equipment used during drilling and sampling activities is described in Section 11.

6.0 FIELD ANALYTICAL PROCEDURES AND DATA REPORTING

6.1 Chemical Data

Temperature, pH, and specific conductance measurements will be made regularly during well development and purging activities. A Fisher Model 107 pH meter will be used for pH measurements, and a YSI Model 33 Conductivity Meter will be used for temperature and specific conductance measurements. Once a minimum of three well volumes have been removed and these three parameters have stabilized, water samples will be drawn using a precleaned Teflon bailer (Refer to Section 10.4). The temperature, pH, and specific conductance measurements made on water from the first bailer will be assumed to be characteristic of aquifer water. All instrument probes will be thoroughly cleaned with laboratory soap, rinsed with methanol, and finally rinsed with distilled water between wells.

6.2 Hydraulic Data

After all the wells have been developed and allowed to recover from development activities for a minimum of 24 hours, static water levels will be determined. All water levels will be recorded as depth to water from a known measuring point on the well casing and will be adjusted to actual water elevations with reference to mean sea level (MSL) using survey data (Refer to Section 10.2). Water levels will be measured with Soiltest Model DR-760 or Johnson Water-Level Indicators and will be recorded to the nearest 0.01 feet. The water level indicators use a water level sensing probe attached to a calibrated cable. When the probe reaches water, a current passes between two wires in the probe, deflecting a meter at the surface. The cable attached to the probe is numbered at 5-foot intervals so that depth to water may be accurately measured with the use of a folding rule with 0.01 foot increments.

After all the wells have recovered from pumping and water sample collection, they will be measured a second time to confirm the previous measurements. The probe will be thoroughly cleaned with laboratory soap, rinsed with methanol, and finally rinsed in distilled water between wells to minimize chances of cross-contamination. Water-level contour maps of each site will be generated from the static water-level measurements recorded during the field activities.

6.3 Lithologic Logging

Soil Samples for lithologic description will be collected as described in Section 8.2 and lithologic logs will be compiled for all boreholes drilled at the base. Organic vapor readings will be taken from the cuttings during drilling as described in Section 12.3.1 and will be noted in the site record book. Elevated vapor readings will be used to readjust site safety requirements and sample collection as needed.

6.4 Surveying Data

The surface elevation of the reference points on all groundwater monitoring wells will be determined to an accuracy of ± 0.01 feet with respect to known elevations on base. This work will be performed by personnel experienced in field surveying to this degree of accuracy, using standard surveying equipment. From these measurements, the measuring point for each well will be determined. All new wells will also be horizontally located to an accuracy of 1.0 foot. Positions of the wells will be recorded on site-specific maps.

6.5 Geophysical Procedures and Data

No surface geophysical procedures are requested in the Statement of Work.

7.0 SAMPLE CUSTODY AND DOCUMENTATION

7.1 Sample Numbering

All groundwater samples collected from Seymour Johnson Air Force Base for laboratory analysis will be given a six-digit code for identification. The coding system corresponds to the well-labeling system used in the Phase II, Stage 1 investigation. In that system, groundwater samples obtained from moitoring wells were designated by the prefix MW-. Similarly, surface water, sediment, and soil test boring samples were designated by SW-, SD-, and STB-, respectively. The coding system will be the same for the Stage 2 investigation, with the exception that the prefix associated with soil test borings will be abbreviated to SB-. The next two digits of the sample identification code will correspond to the number assigned to the boring or sampling location. Those borings that were conducted during the Stage 1 investigation were assigned numbers that range from 1 to 30. To avoid confusion, all borings conducted for the Stage 2 investigation will range in number from 40 to 60, and surface water/sediment sampling stations will be numbered from 10-13. The next two (or more) digits will correspond to the sample depth (for soil or water). For soil, this depth digit will correspond to the split-spoon sample interval from which the soil was obtained below land surface. For groundwater, this depth digit will correspond to the sampling interval that the water was extracted below the water table, using a bailer. Replicate samples will be designated after the last digit with a letter A, B, C, etc. For example, the following sample number corresponds to a replicate groundwater sample collected from well MW-50 between the depths of 22 and 26 feet below land surface:

MW-50, 22-26(B)

All quality assurance (QA) split samples, or duplicates, sent to the Air Force OEHL will be numbered according to the Air Force sample numbering system outlined in AF Form 2752. All RTI QA samples will be numbered using the six-digit code described above. The field team will label the QA samples with a fictitious sample locations or replicate designations. This will minimize the possibility of prejudicial treatment given to QA samples either in the field or in the laboratory.

7.2 Sample Labeling

Each sample container from Seymour Johnson Air Force Base will be labeled with a sticker similar to the example shown in Figure 13. The sticker is part of a three-piece labeling system which will help track samples and prevent misidentification.

The labeling system has a main sticker which is attached to the sample container. On the main sticker, the field team will record the project name, location, date, reagents added, other comments, and sample code. The main sticker and the two associated stickers will be machine stamped in advance of the field work with a common sequential number.

After placing the main sticker on the container, the other two stickers will be placed in the field notebook and on the chain-of-custody form. Samples which require multiple containers will be labeled with one sticker per container. Each container of the set will have a different sequential sticker number, but the same sample code will be used with an A, B, C, etc. suffix. Air Force samples (splits) with multiple containers will all be labeled with the same Air Force number.

7.3 Sample Chain of Custody

The samples will be collected, preserved, sealed and packaged by the RTI field team. All pertinent information on the collection, handling and paperwork for the Seymour Johnson Air Force Base samples will be entered in the project notebook at the time of the activity. The sample stickers will be placed on the sample container and in the notebook at the time of collection. The field team will also enter the sampling conditions and related observations in the notebook at this time.

A Chain-of-Custody Record (Figure 14) will be completed as samples are collected from each sampling location during the day. The last piece of the sample sticker set will be affixed onto the Chain-of-Custody Record and the field team leader will sign the form at the end of the day, indicating that all listed sample containers are accounted for. The signed Chain-of-Custody Record, including time and date of shipment, will be packed with the samples in the shipping container.

Attached to Sample Jar

RESEARCH TRIANGLE INSTITUTE
PO Box 12194 Research Triangle Park, NC 27709

Client ______________ Job # ____________

Location ______________________________

Date __________________________________

Reagent _______________________________

Comments ______________________________

901584 ________ ________ ________
Method Sample Test #

901584

Placed Into Logbook

Attached to Chain of Custody

901584 ________ ________ ________

Figure 13: Example of Sample Labeling System

CHAIN OF CUSTODY RECORD

RESEARCH TRIANGLE INSTITUTE
P.O. Box 12194
Research Triangle Park, NC 27709

Site Designation ____________ Collection Date ____________

Sample Type ____________ Signature of

Sampled By ____________ Field Leader ____________

Project # ____________

Field Measurements: pH ______ ______ ______ ______ s.u.
SC ______ ______ ______ ______ mho/cm

Preservation/ T ______ °C

Reagents Added: ______

Sticker Number	Sample Code/Analysis	Received By: Name/Date/Time/ Organization	Received By: Name/Date/Time/ Organization

Method of Shipment ____________

NOTE: Please return completed form to ____________.

Figure 14: Example of Chain of Custody Record

When the shipping container is received at the RTI laboratory, the samples will be checked against the Chain-of-Custody Record to verify that all containers have been received in good condition. The sample custodian will sign the Chain-of-Custody Record, including time and date of receipt, and return it to the RTI personnel specified at the bottom of the form.

Air Force samples will be collected and an AF Form 2752 will be completed for each sample (multiple container samples will be under one form). The forms will be shipped with the samples to the OEHL laboratory.

7.4 Sample Shipping

The samples collected at Seymour Johnson Air Force Base will be packed with ice while at the sampling site. Water samples with limited holding times will be transported by RTI personnel or shipped by overnight carrier to RTI or a laboratory under subcontract to RTI at the end of the day they are collected. Samples to be sent to the OEHL laboratory will be shipped via overnight carrier. All samples sent by overnight carrier will be packaged in accordance to the detailed procedures outlined in Section 12. The shipper will deliver the samples directly to each laboratory the next day. Field personnel will retain all airbill records and will telephone the laboratory the day of scheduled delivery to confirm receipt of samples. Samples with longer holding times will be stored on-site under controlled refrigeration in RTI's Mobile Environmental Laboratory until a full shipment is collected.

8.0 DRILLING AND INSTALLATION OF GROUNDWATER MONITORING WELLS

The location of each proposed monitoring well and soil test boring will largely be determined during the planning and mobilization phases of the investigation. Base personnel will be contacted prior to the final determination of well locations to ensure minimal disruption of base activities and to confirm that proposed well locations do not conflict with underground utilities locations. Research Triangle Institute personnel will oversee all drilling, monitoring well installation monitoring well development, and sampling activities. Detailed records of subsurface conditions encountered during all boring, well development, and sampling activities will be maintained.

Monitoring well and soil test borings will be advanced using continuous-flight, hollow-stem augers. Six-inch innerdiameter (I.D.) augers will be used for the drilling of all shallow monitoring wells and soil-test borings. Eight-inch I.D. augers will be used in the drilling of the deep well at Site 2. It may also be necessary to use mud-rotary techniques on the drilling of the deep well depending on subsurface conditions. A center stem, plug, and bit attached to the stem may be used to prevent cuttings from entering the hollow stem.

8.1 Drilling

8.1.1 Drilling at Fire Training Area No. 3 (Site 1): Three new shallow groundwater monitoring wells will be installed at Site 1. The approximate proposed locations of these wells is indicated in Figure 8. The depth to the water table near this site in April 1984 was approximately 6 feet below the ground surface. Given the excessively dry conditions in the area during the Summer of 1986, it is anticipated that the water table will be lower than that observed previously.

From the Phase II, Stage 1 report, it is anticipated that the materials encountered in the surficial aquifer will be brown-to-tan, silty, fine-to-medium sands. The top of the Black Creek formation in the area appears to be marked by gray silty fine sands laminated with darker gray silty clays. The three monitoring wells will be screened in the surficial aquifer. Any penetration of the top of the Black Creek aquifer system at this site will be grouted back to the base of the surficial aquifer so that the well is only measuring conditions within the surficial aquifer.

8.1.2 Drilling at Landfill No. 4 (Site 2): Six new shallow groundwater monitoring wells will be installed at Site 2. The approximate locations of these wells are indicated in Figure 9. The depth to the water table downgradient of Landfill No. 4 is anticipated to be approximately 5 to 10 feet below land surface. The top of the screened sections for the 5 proposed shallow downgradient wells may only be approximately 5 feet below the ground surface. One upgradient shallow monitoring well is proposed for this site. The depth of this well cannot be accurately estimated until more detailed and current topographic information is obtained for the site. It is likely, however, that the depth of this well will not exceed 30 feet and that the screen length will be a minimum of 10 feet.

The materials encountered in the subsurface at this site are anticipated to be silty, pebble sands. The top of the Black Creek formation in this area is anticipated to be represented by gray silty fine sands laminated with darker gray silty clays. All six shallow monitoring wells for this site will be screened in the surficial aquifer. Any penetration of the top of the Black Creek aquifer system during the drilling of these wells will be sealed with grout back to the base of the surficial aquifer. One deep groundwater monitoring well is proposed downgradient of Landfill No. 4. This well will be screened within the uppermost productive layer of the Black Creek aquifer system. Based on the screened intervals of the nearest base water-supply wells, it is anticipated that this well may extend 70 to 90 feet below the ground surface.

8.1.3 Drilling Activities at Landfill No. 1 (Site 3): No further drilling activities are proposed for this site. There will only be sampling from an existing monitoring well.

8.1.4 Drilling at Landfill No. 3 (Site 4): Four new shallow groundwater monitoring wells will be installed at Site 4. The approximate locations of these wells are indicated in Figure 10. No information is available regarding the expected depth to the water table or the subsurface materials at this site. It is estimated that the depth of the upgradient well will not exceed 30 feet, and that of the three downgradient wells will not exceed 20 feet each.

8.1.5 Drilling at the DPDO Waste Storage Area (Site 5) One shallow groundwater monitoring well and three shallow soil test borings will be installed at this site. The approximate locations of this well and these borings are indicated on Figure 11. The depth to the water table downgradient of the DPDO area is anticipated to be approximately 10 to 15 feet. Each soil test boring will be terminated at the water table, or at a maximum of 30 feet. The upper 3 to 6 feet of material in this area has been noted to consist of sandy fill containing wood and rock fragments. The fill is underlain by approximaterly 7 feet of silty sand. The top of the Black Creek formation in this area is characterized by laminated dark gray silty clays and lighter gray silty fine sands.

Detailed logs of lithologies encountered during boring operations will be maintained. Special emphasis will be placed on the field identification of contaminated soils. All soil samples will be scanned with an organic vapor analyzer during drilling activities and the results will be included in the boring logs. Once the water table has been encountered, the water level in each borehole will be allowed to stabilize. The water level in each borehole will then be measured and the water surface will be visually examined for the presence of hydrocarbons or other floating contaminants. This information will be included in the boring logs and/or field notebook.

Upon the completion of each soil test boring, the borehole will be tremie-grouted to the surface using bentonite and neat cement grout according to NCNRCD abandonment specifications. Each soil test boring location will be permanently marked and recorded on the project map for the site.

8.1.6 Drilling at the Coal Pile Area (Site 6): Three shallow soil test borings will be drilled at this site. The approximate locations of these borings are indicated in Figure 12. No information is available regarding the expected depth to the water table or the subsurface materials at this site. Each soil test boring will be terminated at the water table, or at a maximum of 10 feet.

Detailed records of lithologies encountered during boring operations will be maintained. Emphasis will be placed on visual identification of potentially contaminated soils. All soil samples will be scanned with an organic vapor analyzer at the time of drilling, and the results will be included in the boring logs. If the water table is reached within the investigative depths, the water level in each borehole will be allowed to stabilize. The water level will then be measured and recorded. The water surface in each borehole will be visually examined for the presence of hydrocarbons or other floating contaminants and this information will be recorded in the boring logs.

Upon completion of each soil test boring, the borehole will be tremie-grouted to the surface using a bentonite and neat cement grout mixture, according to NCNRCD borehole abandonment specifications. Each soil test boring location will be permanently marked and recorded on the project map for the site.

8.2 Soil Sampling

Lithologic samples will be collected at five-foot intervals from all boreholes with the exception of the soil test borings to be conducted at Site 6. At this site, soil samples will be collected at depths of 2.5 feet, 5 feet and 10 feet or where contamination is suspected. Soil sampling will be accomplished using a split-spoon sampler. All soil samples will be characterized at the time of drilling and the descriptions will be included in the drilling log and the Final Report. All samples will be transferred from the split-spoon sampler to an appropriate sample container for transport and storage. The sampler will be decontaminated between sampling horizons and between boreholes as described in Section 11.1. All soil samples will be stored as required by the Air Force until the holding time for all applicable analyses has expired.

8.3 Monitoring Well Construction and Completion

An example of the typical shallow monitoring well construction is provided in Figure 15. All monitoring wells will be constructed of 2-inch, Schedule 80 PVC casing with threaded, screw-type joints. Unless otherwise determined from grain-size analyses performed on soil sample cuttings from exploratory boreholes, a 0.010-inch slot-size will be

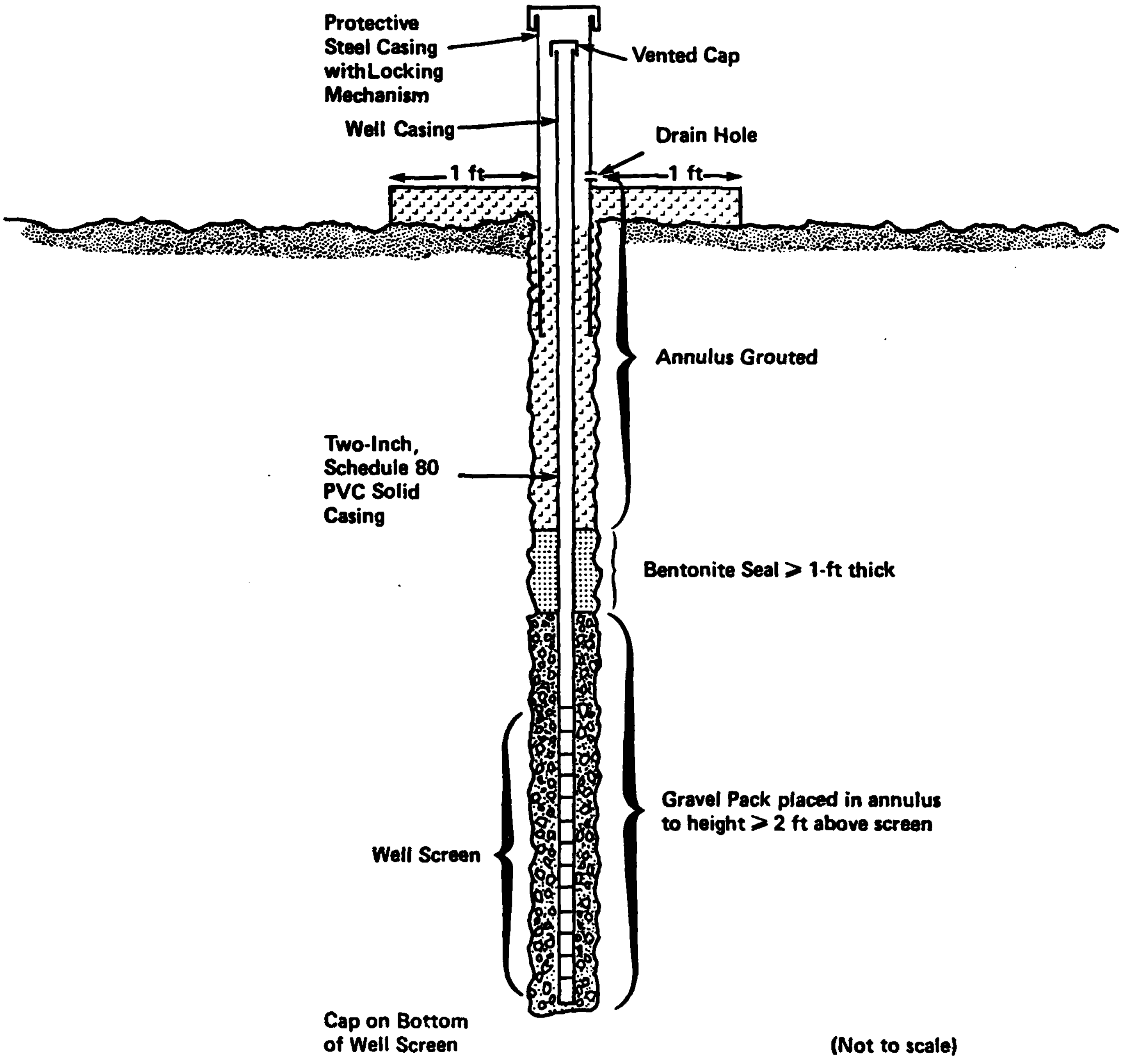


Figure 15: **Typical single-screened interval well**

used for the screens. This size should be compatible for most of the fine-grained deposits expected to be encountered at the base. Ten-foot screens are recommended for the three new shallow wells at Site 1, in order to compensate for the anticipated low water table depths there, and to ensure that floating contaminants will be intercepted. Ten-foot screens are recommended for the shallow downgradient wells at Site 2, provided that such screen lengths will not cause the wells to penetrate significantly into the top of the Black Creek formation. Ten-foot screens will be used for all other shallow monitoring wells. The screened interval for the deep well at Site 2 will be a minimum of 20 feet in length. The bottom of all wells will be permanently capped.

Once the casing has been installed for each monitoring well, the soil formation will be allowed to collapse around the well screen. This natural "gravel pack" will be supplemented with washed and bagged rounded silica sand and/or gravel with a grain size distribution that is compatible with that of both the screen and the formation. The gravel pack will extend from the bottom of each borehole to two feet above the top of the screen. A one-foot seal of granulated or pellet-sized bentonite will be tremied in place above the gravel pack to ensure a complete seal. Clean water will be placed on the bentonite to ensure an adequate swelling of the pellets. The remainder of the annular space will be carefully grouted to the ground surface using a Type I Portland cement/bentonite slurry.

If the amount of well stick-up in an area has been identified as being of concern to base personnel, wells will be completed flush with the land surface (It is anticipated that this type of installation will not be used.). The casing will be cut two to three inches below the land surface, and a protective locking lid consisting of a cast-iron valve box assembly will be installed. The lid assembly will be centered in a three-foot diameter concrete pad sloped away from the valve box. A screw-type casing cap will be provided to prevent infiltration of surface water. The well number will be clearly marked on the valve box lid and the monitoring well will be tagged with the following information "Non-potable water supply well--groundwater may contain hazardous material."

It is anticipated that above-ground surface completions will be used for all wells. The well casings will extend two or three feet above land surface. An endplug or casing cap will be provided for each well. The extended casing will be shielded with a steel guard pipe that is placed over the casing and cap, and seated in a two-foot by two-foot by four-inch concrete surface pad (Figure 15). The pad will slope away from the well sleeve and a lockable cap or lid will be installed on the guard pipe. Three threeinch diameter steel guard posts will be installed if the base personnel determine the well is in an area that needs such protection. The guard posts will be five feet in total length, installed radially from each wellhead and recessed approximately two feet into the ground. The guard posts will not be installed in the concrete pad placed at the well base. The protective steel sleeve will be painted and the well permanently numbered on the sleeve exterior. The monitoring well will be labeled with the following information "Non-potable water supply well--groundwater may contain hazardous material."

Locks will be provided for both flush and above-ground completions. The keys to these locks will be turned over to the base point of contact following the completion of field activities.

8.4 Well Development

Each monitoring well will be developed using a small-diameter submersible pump and/or a bailer until the discharge water is as clear and free of sediment as possible. The rate of flow, pH, temperature, and specific conductance of the well water will be measured during development. This information will be included in the Draft and Final Report. Any well water that appears to contain floating contaminants will be containerized and base personnel will be contacted. Hand-operated pumps will be used as a safety precaution in wells where petroleum-related products are suspected. PVC bailers will be used for development in wells with extremely low yields.

8.5 Geophysical Logging

No borehole geophysical logging is requested in the Statement of Work.

9.0 PUMP TEST

No pump test is requested in the Statement of Work.

10.0 GROUNDWATER MONITORING AND SAMPLING

10.1 Groundwater Level Measurements

The static water elevation at each monitoring well will be measured prior to all purging and sampling activities. Measurements will be made with respect to a known datum point, generally a permanent notch or mark at the top of the inner casing. An electrical groundwater level indicator will be used to determine the depth of water to the nearest 0.01 foot below the datum. These measurements will be reported with reference to mean sea level (MSL). Water levels will be re-measured in each well both at the end of the sampling activities and once the water level has stabilized.

10.2 Surveying of Wells

All wells will be surveyed to determine their elevation to the nearest 0.01 foot. Ground surface and measuring point elevations will be reported for each well. Horizontal coordinates for each well will be determined to an accuracy of 1.0 foot and will be recorded on project maps. The ground surface elevation will also be surveyed at each surface-water and sediment-sampling station. All reference bench marks must be traceable to established USCGS or USGS survey markers.

10.3 On-Site Analysis

Prior to purging a well for a sample, a small volume of water will be bailed for a health and safety organic vapor scan. The water will be drawn from the top of the water table, decanted into a transport container, and inspected for floating hydrocarbons. The water sample will be covered for approximately 10 minutes and scanned for the presence of organic vapors using an OVA. Results of these analyses will be recorded.

All water samples will be analyzed on-site for pH, specific conductance, and temperature during and following purging of the well and prior to the collection of samples for off-site analysis. Measurements of temperature, pH, and specific conductance of surface waters will be made directly in the stream. The results will be recorded in the sampling log and will be included in the Final Report.

10.4 Sampling for Off-Site Analysis

Prior to all sampling activities, each well will be purged using either a decontaminated submersible pump or a bailer. The choice of the well-purging device will be made considering the results of the preliminary inspection of the well water. A minimum of three well volumes of water will be removed and the temperature, pH, and specific conductance will be monitored prior to sampling. The well water will be considered stable once the color and odor of the water stays constant, the pH no longer varies more than ± 0.1 unit, the temperature remains within ± 0.5°C, and the specific conductance remains within ± 10 µmhos.

Following well purging a clean Teflon bailer will be slowly lowered into the well until it is completely submersed within the water column. All samples for volatile organic analysis will be collected from the first full bailer volume. To prevent significant aeration of the sample, the bailer will be emptied slowly into a clean beaker and then carefully poured into the appropriate containers.

Subsequent bailer volumes will be used to sample for the other constituents. A one-liter beaker will be used for the collection of split samples. If more than one beaker of sample water is needed from each well, all bottles for a given lab procedure will be filled from the same beaker.

All sample bottles, beakers, and sampling equipment will be cleaned according to EPA precleaning criteria. Samples for dissolved metal analysis will be filtered in the field using clean Buchner funnels and disposable 0.40 micron membrane filters. A disposable glass fiber prefilter will also be used to remove very large particulates or floating hydrocarbons as well as reduce filtering time. As with volatile organics, all attempts will be made to avoid aeration of samples for metal analysis prior to and during filtering. Immediately after filtering, the filtrate will be acidified to pH 2 (or less) to keep the remaining metals in solution.

One surface water sample and one sediment sample will be collected from each specified location. In order to prevent cross-contamination, downstream samples will be collected first, and water samples will be collected prior to the collection of sediment samples at each sampling station. Surface water samples will be collected using precleaned glass beakers. The water will then be transferred to appropriate, precleaned sample containers and preserved in accordance with laboratory specifications. Sediment samples will be collected using a precleaned stainless steel scoop and will be composited in a precleaned stainless steel mixing bowl. Representative volumes of the sediment will be placed in precleaned sample containers and chilled until delivery to the laboratory.

11.0 DECONTAMINATION PROCEDURES

11.1 Drilling, Soil Sampling, and Monitoring-Well Installation

All drilling equipment, including truck-mounted rig. augers. and drill bits will be steam cleaned prior to entry on Seymour Johnson Air Force Base. The drill rig and equipment will be cleaned with high pressure and temperature water and detergent and then rinsed with clean water prior to mobilizing from one investigation site to another. Soil boring and monitoring-well installation will proceed from the least contaminated site to the most contaminated site. Within a site, soil boring and monitoring-well installation will proceed from the least contamiated area to the most contaminated area. During the subsurface investigation, all soil sampling equipment will be thoroughly washed prior to the collection of each drive sample. In addition, gloves worn by field personnel handling the soil samples will be decontaminated between each soil sample by thoroughly washing them with detergent and water and rinsing in clean water. Prior to the installation of monitor wells, the PVC casings and screens will be thoroughly cleaned with detergent and water and rinsed with clean water. All screen and casing and other well construction materials will be new. No glues or lubricants will be used on the casing.

11.2 Well Development

All the equipment used for well development aquifer will be thoroughly cleaned with detergent and water prior to use. A hand bailer, centrifugal pump and/or submersible pump will be used to develop the wells. The method of well development will depend on water level depth and aquifer characteristics. The bailer or pump and hoses will be washed in soap and water, and rinsed with clean water prior to being placed in a monitor well. An organic vapor analyzer (OVA) will be used to check the head space in the well prior to well development or pump testing. If a reading of more than 5 ppm (total organic vapors) above background is recorded, special handling of the water to be withdrawn from the well will be required. The contaminated water will be contained in drums or tanks until the water can be properly disposed of on base (likely to be discharged into base oil-water separators).

11.3 Water Level Measurements

Water level measurements will be taken with an electric water-level indicator prior to purging the well for sampling. The water level probe will be washed with soap and water, rinsed with methanol, and finally rinsed with distilled water between wells.

11.4 Water Sampling

Following development, wells will be left at least one day before sampling. Following this waiting period, the wells will be evacuated or purged using a teflon hand bailer until temperature, pH, and conductivity are stabilized. The bailer will be washed and double rinsed before and after each use. The water sample for laboratory analysis will be collected using a teflon bailer. The bailer, and transfer vessel will be washed with Alconox detergent, followed by rinses with drinking-quality water and distilled water. All sampling equipment will be thoroughly air-dried after cleaning. New nylon or Teflon-coated stainless-steel bailer line will be used for each well to avoid sample cross-contamination. Surface-water sampling equipment will be washed and rinsed in the same sequence as groundwater sampling equipment.

11.5 Sediment Sampling

Sediment sample collection from Stoney Creek or its tributaries will be done with stainless steel sampling equipment. This equipment will be thoroughly cleaned with water and detergent, methanol, and double rinsed with distilled water prior to taking a sediment sample at each designated sample location along the creek.

12.0 SAMPLE HANDLING AND PACKING

12.1 Split Sample Procedures

All soil and water samples will be collected in duplicate to check the quality of analytical data. This procedure of collecting duplicate samples will be implemented to provide a quality control check of the laboratory and for monitoring combined sampling and analytical precision. Soil and water sample splitting procedures are presented in this section.

12.1.1 Soil Samples: Soil samples will be collected in pairs from each soil test boring and sediment sampling site. One set of soil samples will be packaged and sent to RTI for analysis. The other set will be delivered to the Seymour Johnson Air Force Base Point of Contact (POC) for selection of 10% of the split samples. The POC will package the samples using packing and shipping materials supplied by RTI. The split samples will be shipped by RTI using an overnight delivery service to USAF OEHL/SA at Brooks AFB. Shipment will take place within 24 hours of receipt from the POC.

An additional 10% of the split-sample set will be chosen by RTI as blind field duplicates. The duplicates will be labeled and numbered as previously described and shipped to RTI's laboratory with the normal sample shipment.

12.1.2 Water Samples: Groundwater samples will be collected from all proposed and existing monitoring wells as previously described. Groundwater will be sampled using a teflon bailer, which will be decontaminated before each sample is collected. As with the soil sampling, all samples will be split into two sets (providing sufficient water is available in holes; low-yield wells may not produce enough water volume for 2 to 3 sample sets). Volatile organic compound (VOC) samples will be split by filling all necessary 40-ml vials successively from the same bailer. VOC samples require a minimum of disturbance, and aeration is unacceptable. We will assume that water collected within a single bailer will be well mixed, resulting in the collection of chemically homogeneous duplicate samples. Non-VOC samples will be collected by placing water from the bailer into an inert intermediate vessel. Once the intermediate vessel is full (and its contents assumed homogeneous), sample bottles will be filled from that vessel.

Duplicate groundwater samples for shipment to OEHL and to RTI will be handled, packed and shipped using the same procedures described above for soil duplicates.

Blanks (ultrapure lab water) will be prepared to check field procedures for potential cross contamination of groundwater samples. Field blanks will be prepared at a frequency of one blank for every 20 samples collected per analytical parameter. These will be prepared so that the blank water will contact the same sampling devices as the groundwater. All sampling equipment will be decontaminated as usual and then blank water will be poured into the bailer. VOC bottles will be filled directly from the bailer. Additional water will be placed in the bailer and then into the intermediate vessel. Non-VOC bottles will be filled from the vessel.

12.2 Sample Containers

The following sample containers will be used for samples collected at Seymour Johnson Air Force Base.

12.2.1 Soil

Contaminated drill cuttings and surface sediment: 225 mL wide-mouth glass jars with polyethylene inner bag for metals; and aluminum foil-lined caps for organics.

Subsurface Soils: 1 1/2" (OD) x 4"-long brass tubes with aluminum-lined caps for organics; and 225 mL wide-mouth glass jars with polyethylene inner bag for metals and cyanide.

All sample containers will be cleaned according to EPA protocols prior to use. They will be stored in a clean, dry area with the lids on until used. Wherever required, preservatives will be added to the sampling bottles.

12.2.2 Water:

Petroleum Hydrocarbons: One 1-liter amber glass bottle with Teflon-lined cap.

Purgeable Organics: Two 40-milliliter clear glass vial with screw cap Teflon-lined septum.

Extractable Organics: Two 1-liter amber glass bottle with Teflon-lined cap.

Alkalinity: One 1-liter polyethylene bottle.

Lead: One 250-milliliter Teflon bottle with a Teflon-lined cap

Thirteen Priority Pollutant Metals: One 1-liter polyethylene bottle with a polyethylene cap.

Anions: One 1-liter polyethylene bottle with a polyethylene cap.

Total Dissolved Solids: One 250-milliliter polyethylene bottle

Total Cyanide: One 1-liter polyethylene bottle with polyethylene cap.

12.3 Sample Handling

12.3.1 Soil Samples: The subsurface soil samples will be visually described by the project hydrogeologist in accordance with the standard recommended practice for description of soils (Visual-Manual Procedure), ASTM Designation D-2488, and with the Unified Classification System (USC), ASTM Designation D-2487. Sample descriptions were included on the boring logs and in the site sampling log.

Split-spoon soil cores will be scanned for gross organic contamination with a Foxboro Model 128 Organic Vapor Analyzer (OVA) operated in the survey mode. Soil samples for scanning will be removed from the split-spoon sampler, placed in zip-lock plastic bags, and sealed with a minimum (approximately 5 to 10 ml) of "head space." The outside of the bag will be cleaned and set aside for a short period of time to allow organic vapors to accumulate within the head-space. After approximately 5 minutes, the OVA probe will be carefully inserted into the bag and the organic vapor concentration will be recorded. The project hydrogeologist will attempt to prepare each sample in the same manner (e.g., sample volume, time for head space accumulation, etc.) so that the OVA readings from different samples could be related qualitatively.

12.3.2 Water Samples: The monitoring well will be flushed or purged immediately before the sample is taken. Purging consists of removing a minimum of three well volumes of water or until a stabilized reading of pH, conductivity and temperature is achieved. Immediately after flushing the well, the sample will be collected and put into laboratory-cleaned containers. The two 40-ml vials for volatile organics analysis (VOA) will be filled first, followed by containers for metals and other organics. The metals sample will be filtered in the field using a 0.45 micron membrane filter. The metals sample will be preserved with nitric acid.

Field measurements will include pH, specific conductance, and temperature. The pH measurements will be made with a pH meter which will be calibrated before and after sampling as previously described. Specific conductivity and temperature will be measured using a YSI Model 33 Conductivity Meter. The instrument will be calibrated using a conductivity standard at routine intervals throughout the sampling program.

12.4 Sample Preservation and Storage

The following preservation and storage techniques will be used for samples collected at Seymour Johnson Air Force Base:

12.4.1 Soil Samples:

All: Ice to 4°C

The labeled and logged samples will be placed immediately into coolers containing ice or a chemical coolant ("Blue Ice") to maintain sample temperatures at or near 4°C.

12.4.2 Water Samples:

VOC: Ice to 4°C

Petroleum Hydrocarbons: H_2SO_4 to pH 1/2.2, ice to 4°C

Minerals and Heavy Metals: Filter with 0.45 micron filter, HNO_3 to pH 1/2.2, ice to 4°C

Total Phenols (420.1): H_2SO_4 to pH 1/2.2, ice to 4°C

Commons Ions, Total Dissolved Solids and Alkalinity: Ice to 4°C

12.5 Procedures for Packing Low Concentration Samples

Most, if not all, of the soil and water samples to be shipped from Seymour Johnson Air Force Base are expected to be classified as low concentration samples. These samples will be temporarily stored in refrigerators prior to packaging and shipment to the laboratory.

Sample packing procedures for low concentration samples are as follows:

- Determine maximum weight allowed per package from the shipper.
- Mark volume level on bottle with grease pencil.
- Place about 3 inches of inert cushioning material such as vermiculite or zonolite in bottom of cooler.
- Labels/Sample Tags Tag or label each sample with a data, time of collection, site name and brief description on a label that will not come off. Use only idelible ink on all labels and tags. Numbered sample tags will be used on all samples. The organic/inorganic traffic report number labels must appear on the bottles. Cover these with clear plastic tape.
- Place bottles in cooler in such a way that they do not touch.
- Put VOC vials in Ziploc bag and place them in the center of the cooler.
- Pack bottles, especially VOC vials, in loose ice or ice in plastic bags.
- Fill cooler with cushioning material. Ice is not cushioning material.
- Put paperwork (Chain-of-Custody Forms) in plastic bags and tape with masking tape to inside lid of cooler.
- Tape cooler drain shut.
- After acceptance by Federal Express or shipper, wrap cooler completely with strapping tape at two locations. Secure lid by taping. Do not cover any labels.
- Place lab address on top of cooler.
- Put "This Side Up" labels on all four sides and "Environmental Samples" labels on at least two sides.
- Affix numbered custody seals on front right and back left of cooler. Cover seals with wide, clear tape.

NOTE: Remember that each cooler cannot exceed 70 pounds for Federal Express shipment. Therefore, it is possible to pack a maximum of 6 half-gallon bottles and corresponding VOA vials with about 5 pounds of ice per cooler.

12.6 Procedures for Packing Medium and High Concentration Samples

None of the samples to be collected during this investigation are expected to be classified as medium or high concentration since sampling will not be made from hazardous waste sites or hazardous waste containers. All of samples to be collected during this investigation will be environmental soil and water samples, therefore, special handling procedures for high concentration samples are not required.

13.0 SITE CLEAN-UP

The general area surrounding each soil boring and monitor well site will be cleaned of drilling supplies and debris following the completion of each well or boring. When possible, all noncontaminanted borehole cuttings will be returned to the borehole or spread on the ground adjacent to the borehole. In public areas, the borehole cuttings will be removed from the site. Cuttings suspected of being hazardous waste (based on discoloration, odor, or organic vapor meter readings) will be containerized in clean 55-gallon drums with removable tops and band closures. Suspected hazardous waste will be sampled and analyzed at the lab for E.P toxicity and ignitability to determine the actual hazard and disposal required. Ultimate disposal of material determined to be hazardous will be through USAF base personnel.

14.0 FIELD TEAM ORGANIZATION AND RESPONSIBILITIES

14.1 Organization

The Research Triangle Institute's proposed organization of the IRP Survey at Seymour Johnson Air Force Base is shown in Figure 16. Two departments within RTI's Center for Environmental Measurements will have the responsibility for the field work, chemical analyses, and reporting activities required for this stage of the IRP Survey. These include the Hydrogeology Department and the Environmental Chemistry Department, managed by Mr. W. J. Alexander and Dr. W. F. Gutknecht, respectively.

RTI will subcontract the drilling and well installation services to Bore and Core, Inc. of Raleigh, NC. Mr. A. M. Demarest will be the principal point of contact within Bore and Core, Inc. RTI will subcontract portions of the analytical services (organic analyses) to Industrial and Environmental Analysts, Inc. (IEA) in the Research Triangle Park, NC. Mr. J. B. Adamovic will be the principal point of contact within IEA.

14.2 Responsibilities

Mr. Alexander will serve as the Project Leader for this IRP survey and will be responsible for the technical and management aspects of the project, particularly as pertaining to field activities, interpretation of findings, and reporting. Dr. Gutknecht will primarily be responsible for the performance of chemical analyses, within RTI and under subcontract to RTI, and associated Quality Assurance requirements. Professional staff within both departments will be assigned to various aspects of the IRP survey and will be responsible for specific tasks as appropriate such as overview of drilling activities, field data collection efforts, analytical testing, and reporting.

14.3 Training

RTI personnel who will be involved in field operations have undergone occupational medical examinations and will be responsible for compliance with the site safety plans. Supplemental in-house training will be provided as needed for all site-safety procedures, the use of safety equipment and air monitoring devices, detailed field sampling activities, data reporting, and QA/QC procedures.

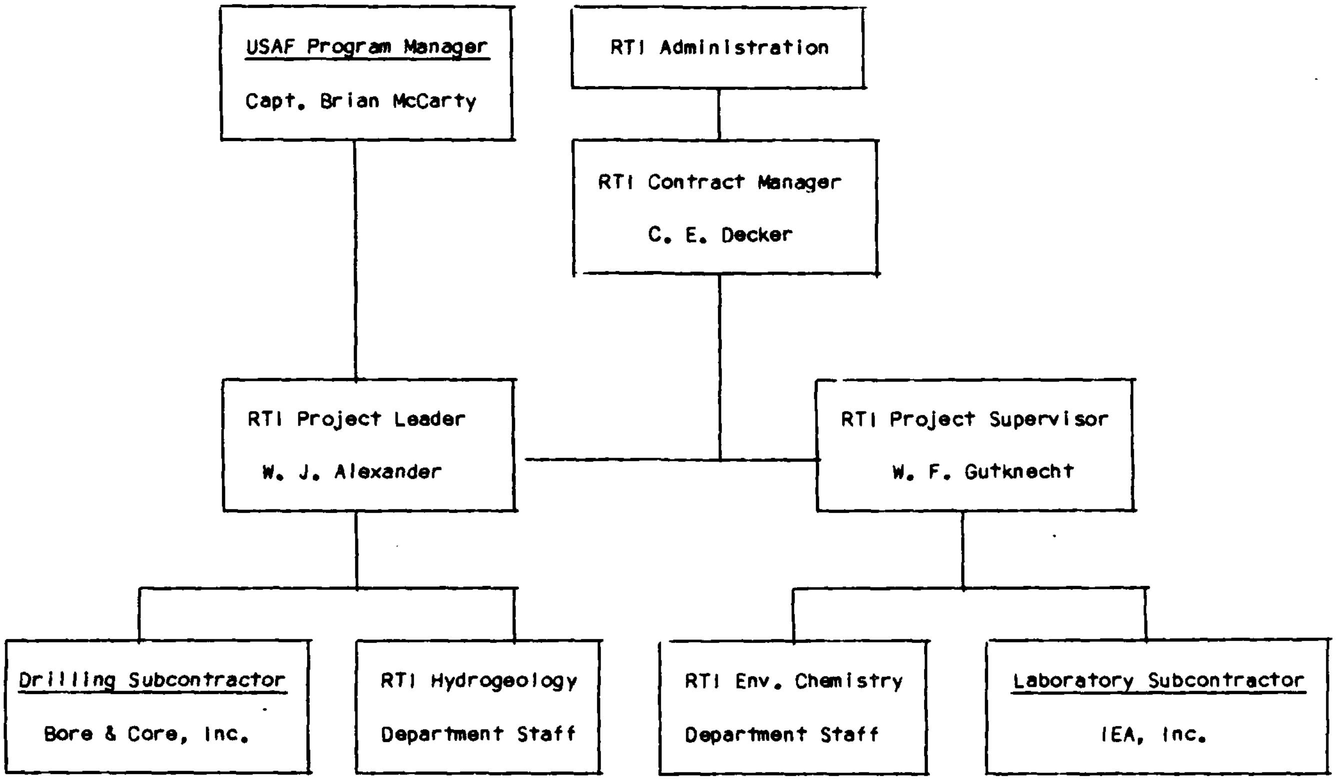
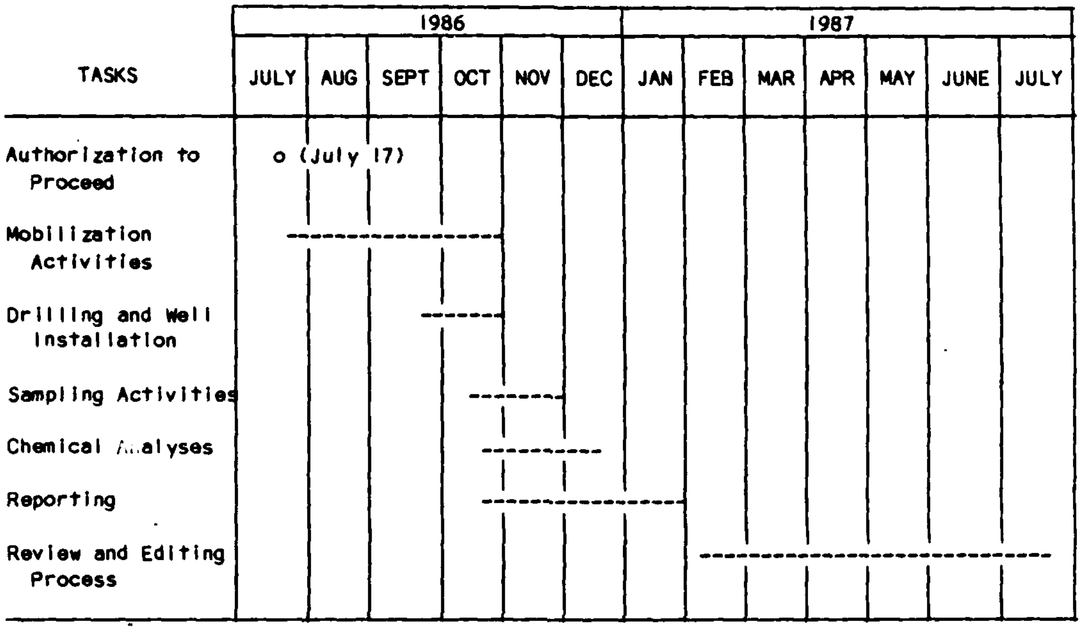


FIGURE 16: Project Organization

15.0 SCHEDULE

The anticipated schedule for the Phase II, Stage 2 IRP Survey at Seymour Johnson AFB is shown in Figure 17. The official authorization date of the survey was July 17, 1986. All mobilization and drilling activities should be completed by the end of October 1986, depending on the accessibility conditions in the flood plain of Stoney Creek. Accordingly, the sampling activities should be completed by November, 1986 and analytical results completed by December, 1986. The first draft report of findings is scheduled for the end of January, 1987. It is uncertain how long the report review process will require, but the final report will be provided to the Air Force on or before mid-July 1987.

Figure 17: PROPOSED SCHEDULE



APPENDIX A

HEALTH AND SAFETY PLAN

GENERAL

The safety plan presented herein gives guidelines for basic safety procedures and equipment to be utilized by Research Triangle Institute during the course of IRP Phase II investigations at Seymour Johnson AFB, NC. Samples collected during the Phase II, Stage 2 investigation will be typically environmental water and soil samples, as opposed to hazardous waste samples, and normally do not require unusual levels of personnel protection.

Since this project involves the investigation of more than one site at the Seymour Johnson AFB, an independent health and safety plan was prepared for each of the six sites. The detailed health and safety plan for each site, including site background information, site sketch, potential hazards, site safety work plan, and emergency information is included as a part of this Appendix.

INFORMATION REVIEW

Prior to initiating the Phase II, Stage 2 survey field work, the Phase I and Phase II, Stage 1 reports were reviewed in detail to identify known hazardous wastes or conditions that may be encountered at each site. Available toxicological data on materials suspected of being present at the sites were reviewed and utilized to determine the level of personnel protection at each site.

Safety hazards requiring special attention will be addressed on an individual basis using appropriate assessment methods, and equipment and procedure recommendations given in the EPA Field Health and Safety Manual (EPA, 1980) and the EPA Safety Manual for Hazardous Waste Site Investigations (EPA, 1979). Hazardous conditions will be monitored during the investigation and appropriate action taken to modify the Health and Safety Plan as necessary.

MEDICAL MONITORING PROGRAM

The Project Leader for the Phase II field investigation will determine whether a medical monitoring program is necessary. If hazard levels are judged high enough to warrant this procedure, all field personnel will participate in a medical monitoring program. Guidelines for the program are given in Appendix I of the EPA Field Health and Safety Manual (EPA, 1980).

All RTI personnel assigned to the field aspects of this project will have completed background occupational medical examinations prior to conducting field work on any of the designated sites. Subcontractors working on these sites will be advised of the potentially hazardous nature of this work and will be provided a complete copy of this Appendix.

FIELD PERSONNEL INDOCTRINATION

All field personnel, including subcontract personnel, will be informed by the Project Leader and/or Site Safety Officer (Mr. S. A. Guthrie) of required safety equipment and procedures, as outlined in the attached Health and Safety Plans, prior to beginning on-site work. Subjects covered will include personal safety gear, general and site specific safety procedures, and incident notification procedures. The Site Safety Officer will be responsible for maintaining a thorough account of all daily activities performed by RTI and its subscontractors while on site.

PERSONNEL PROTECTION GEAR

The following items will be required for all field personnel:

- Tyvek disposable coveralls,
- Rubber boots,
- Rubber gloves,
- Hard hats, and
- Eye protection (safety glasses or goggles).

Hearing protection (disposable ear plugs) will be available for all potential noise hazards. Cartridge-type respirators will be available on-site for protection against inhalation of dust or vapors. If strong vapors are encountered, respirators will be utilized to facilitate evacuation of personnel and equipment from the site until the situation can be assessed or corredted. Individuals will be individually fitted and instructed on the care and use of their respirator, prior to field work beginning.

Personal equipment described above will offer adequate protection for most situations anticipated during the course of Phase II, Stage 2 investigation field work. When conditions are identified that require a higher level of personal protection, the EPA Safety Manual for Hazardous Waste Site Investigations will be referred to for guidance.

SAFETY PROCEDURES

Hard hats and eye protection will be worn when appropriate, as directed by the Project Leader and/or Site Safety Officer. Protective clothing (boots, gloves, and coveralls) will be worn while working at the designated sites. Coveralls will be changed a minimum of once daily.

The project field supervisor will consult with the base environmental coordinator or other responsible point of contact regarding site-specific hazards including potential underground utilities prior to initially entering the sites. Special procedures for entering and working at particular sites will be clarified and conveyed to all field personnel. Examples of areas requiring strict procedures are active runways or taxiways, fuel handling or storage areas, and secure areas.

As a general rule, no eating, drinking, or smoking will be allowed while working on the designated site. This includes personnel at the decontamination areas. Avoid all hand-to-mouth contact while contamination of your clothing or body is possible.

INCIDENT/ACCIDENT NOTIFICATION PROCEDURES

A complete list of emergency phone numbers and contacts are attached to the last page of Appendix A (page A-41). Each person working on the sites will be instructed on how to use this emergency information. A copy of the Health and Safety Plan containing this emergency information will be provided to all persons working on these sites. In addition, each person working on these sites will be shown the location of the Air Force Base Hospital and emergency room (Figure A-1). The base hospital will be notified in advance of the field operations.

After contacting appropriate emergency services, or in non-emergency incidents, the USAF project contact should be notified of the incident or accident so that it can be dealt with according to base policies and procedures.

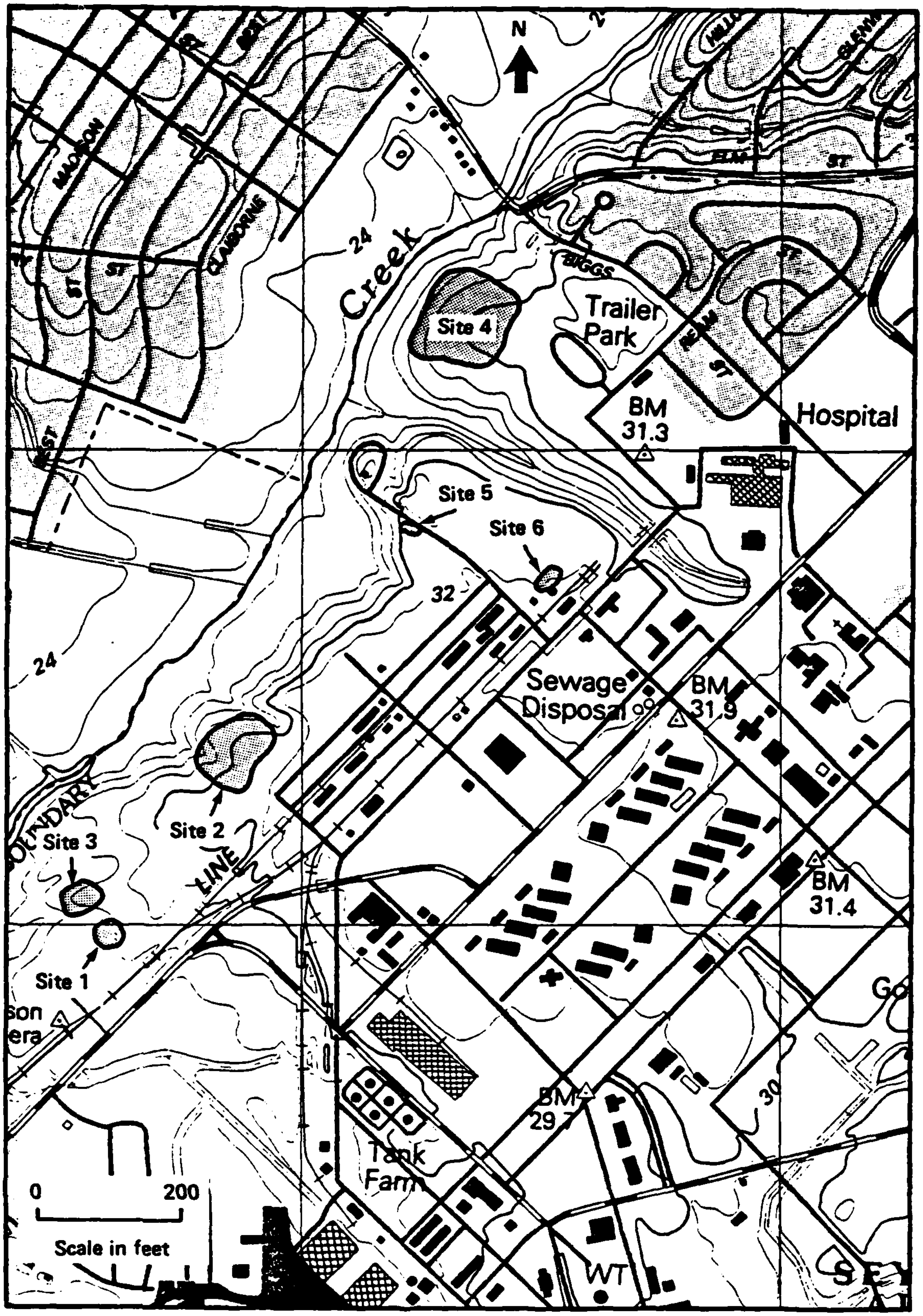


Figure A-1: Location of Six Sites and Base Hospital

SITE SAFETY PLAN

FIRE TRAINING AREA #3

(SITE 1)

GENERAL INFORMATION

PROJECT NAME: Seymour Johnson AFB **RTI PROJECT NO.** 432U-2676-16

SITE: Fire Training Area #3 (Site 1)

PLAN PREPARED BY: R. W. Pratt **DATE:** 8/11/86

REVIEWED BY: W. J. Alexander **DATE:** 9/9/86

DATE:

INVESTIGATION OBJECTIVE(S): Conduct subsurface investigation to assess the potential ground water contamination emanating from the fire training area.

PROPOSED DATE OF INVESTIGATION: October/November 1986

SUMMARY OF OVERALL HAZARD: **Serious:** ___ **Moderate:** ___ **Low:** X **Unknown:** ___

SITE HISTORY & DESCRIPTION

SITE DESCRIPTION: The site is located adjacent to a fenced truck yard off a southern extension of Collier Avenue (Figure A-2). The area is approximately 0.5 acres in size and is relatively flat and covered with low grass and weeds.

ACTIVITIES PERFORMED ON SITE PRIOR TO INVESTIGATION: One monitor well (MW-11) was installed to a depth of 30 feet during the Phase II, Stage I IRP investigation.

PREVIOUS STUDIES PERFORMED: IRP-Phase I Report (July 1982) and IRP-Phase II, Stage I Report (July 1985). The site is still used for fire training.

UNUSUAL FEATURES (Containers, Buildings, Buried and Above Ground Utilities, Bodies of Water, Terrain): Possible buried fuel lines in the area. Drillers will be alert for possible pipelines and other utilities. Site will be examined by USAF personnel for potential underground utility lines.

WASTE CHARACTERISTICS **SITE I**

WASTE TYPES: **Liquid:** X **Solid:** ____ **Sludge:** ____ **Gas:** ____

CHARACTERISTICS: **Toxic:** ___ **Volatile:** X **Ignitable:** X
Radioactive: ___ **Reactive:** ___ **Corrosive:** ___

KNOWN OR SUSPECTED SUBSTANCES ON SITE:

Oil and Grease (suspected)

Jet Fuel (suspected)

Organic Halogens (suspected)

PHYSICAL HAZARDS: **Heat:** X **Cold:** ___ **Noise:** ___
Radiation: ___ **Other (Specify):** ____

Comments: (See work limitations - page 3 of 5)

HAZARD EVALUATION

Samples to be collected during this site investigation will be taken downgradient from the fire training area and are expected to be classified as environmental soil/water samples. Previous studies in the fire training area indicated no groundwater contamination based on analysis for nitrate, oil and grease, total organic carbon, total organic halogens, and phenols. Therefore, on the basis of the Phase I and II report findings, it is anticipated that no unusual levels of personnel protection (beyond level D) will be required. If hazardous materials are suspected or encountered during the course of the field work, this plan will be amended and additional precautionary measures will be implemented. Field personnel will not be permitted within the diked area surrounding the fire training area. Also, it may be necessary to leave the site area in the event of any fire-training exercises.

PERIMETER ESTABLISHED: **Site Map/Sketch Attached:** Yes
Perimeter Identified: Yes **Site Fenced Off/Secured:** No
Contaminated Areas Identified: Yes

Comments: Most of the potential contaminants would be expected within the diked area surrounding the fire-training area.

TYPE OF WORK ACTIVITY TO BE PERFORMED:

Field Survey/Site Inspection: X
Surface Geophysical Survey: ___
Monitor Well Installation: X
Monitor Well Sampling: X
Surface Water Sampling: ___
Soil Sampling: X
Soil Test Boring: X
Soil Gas Sampling: ___
Hand Augering: ___
Other: ___

PERSONAL PROTECTION:

Level of Protection: A ___ B ___ C ___ D X

Modifications: ___

Personal Protective Equipment/Procedures: Tyvek coveralls, hard hats, safety glasses or goggles, neoprene gloves, and neoprene steel-toed boots. Respirators will be available in the event waste materials are encountered and organic vapors go above 5 ppm in the breathing zone in the work area.

Surveillance Monitoring Equipment/Procedures: An Organic Vapor Analyzer (OVA) will be used to monitor organic vapors in and around the work area.

Work Limitation (Time of Day, etc.): Field work will be conducted during daylight hours only. If air temperature and humidity become excessive, the time of work day and duration of work time may be altered due to heat stress potential.

DECONTAMINATION AND DISPOSAL PROCEDURES:

Decontamination Equipment/Procedures: High pressure water with detergent is required for cleaning all drilling equipment between each soil test boring and monitor well site. All sampling equipment including gloves used in sample handling will be cleaned with tap water and detergent and rinsed in deionized water between each sampling event. Boots and other field equipment will be cleaned on a daily basis. Tyvek coveralls will be disposed of in plastic garbage bags at the close of each day.

Decontamination Facilities/Designated Areas: All steam cleaning will be conducted at AFB car wash facility on Curtiss Avenue. Runoff from the cleaning process is diverted through an oil/water separator.

Contaminated Sample Disposal Procedures: All soil samples determined to be contaminated by OVA screening will be contained in 55 gallon drums and will be disposed of by the USAF. Obviously contaminated water will be containerized for subsequent disposal.

Contaminated Sample Disposal Facilities/Designated Areas: The USAF will handle the disposal of all contaminated soil samples not transported to laboratories for analysis. It is anticipated that potentially contaminated water containerized from monitoring well-development process may be disposed of in oil water separators on base, pending base examination and approval.

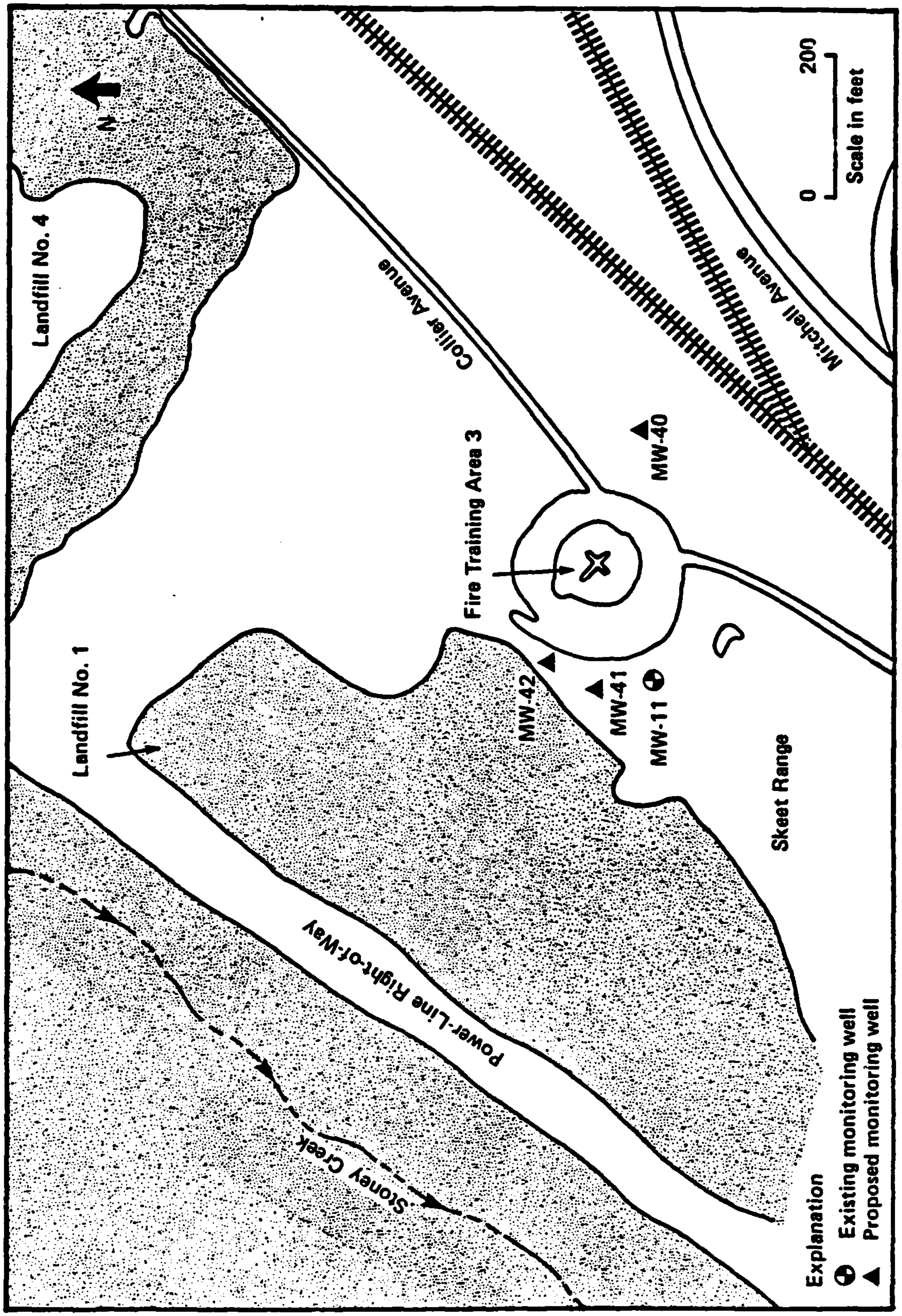


Figure A-2. Site 1.

SITE SAFETY PLAN

LANDFILL NO. 4

(SITE 2)

RESEARCH TRIANGLE INSTITUTE
FIELD INVESTIGATION TEAM
SITE SAFETY PLAN

GENERAL INFORMATION

PROJECT NAME: Seymour Johnson AFB **RTI PROJECT NO.** 432U-2676-16

SITE: Landfill No. 4 (Site 2)

PLAN PREPARED BY: R. W. Pratt **DATE:** 8/11/86

REVIEWED BY: W. J. Alexander **DATE:** 9/9/86

INVESTIGATION OBJECTIVE(S): Conduct subsurface investigation to assess the potential ground water contamination eminating from the fire training area.

PROPOSED DATE OF INVESTIGATION: October/November 1986

SUMMARY OF OVERALL HAZARD: **Serious:** ____ **Moderate:** ____ **Low:** X **Unknown:** ____

SITE HISTORY & DESCRIPTION

SITE DESCRIPTION: The landfill is located on approximately 8 acres between Collier Road and Stoney Creek (Figure A-3). The investigation area is a strip of land approximately 400-500 feet wide between Stoney Creek and the landfill. The landfill is relatively flat, devoid of trees and covered with grass and weeds. The investigation area is approximately 10 feet lower in elevation and has a thick vegetation cover.

ACTIVITIES PERFORMED ON SITE PRIOR TO INVESTIGATION: The landfill has been in operation since 1970 and is still used for the disposal of construction debris. No garbage or trash disposal has occurred since 1978.

PREVIOUS STUDIES PERFORMED: IRP-Phase I Report (July 1982) and IRP-Phase II, Stage I Report (July 1985).

UNUSUAL FEATURES (Containers, Buildings, Buried and Above Ground Utilities, Bodies of Water, Terrain): High voltage overhead power lines traverse the site along the north boundary. (See attached site map)

WASTE CHARACTERISTICS

SITE 2

WASTE TYPES: **Liquid:** X **Solid:** X **Sludge:** ____ **Gas:** ____

CHARACTERISTICS: **Toxic:** X **Volatile:** X **Ignitable:** X
Radioactive: ___ **Reactive:** ___ **Corrosive:** ___

KNOWN OR SUSPECTED SUBSTANCES ON SITE:

TOC	Benzene
Phenol	Ethylbenzene
TOX	Toluene
Lead	Oil and Grease
Cadmium	

PHYSICAL HAZARDS: **Heat:** X **Cold:** ___ **Noise:** ___
Radiation: ___ **Other (Specify):** ______

Comments: (See work limitations - page 3 of 5)

HAZARD EVALUATION

Samples to be collected during this site investigation will be taken downgradient from the landfill and are expected to be classified as environmental soil/water samples. Previous studies inside the landfill perimeter indicated only low concentrations of the above mentioned substances. Therefore, on the basis of the Phase I and Phase II, Stage I IRP Report findings, it is anticipated that no unusual levels of personnel protection (beyond Level D) will be required. If hazardous materials are suspected or encountered during the course of the field work, this plan will be amended and additional precautionary measures measures will be implemented.

SITE SAFETY WORK PLAN

PERIMETER ESTABLISHED: **Site Map/Sketch Attached:** Yes
Perimeter Identified: Yes **Site Fenced Off/Secured:** Yes
Contaminated Areas Identified: Yes

Comments: ____________________

TYPE OF WORK ACTIVITY TO BE PERFORMED:

Field Survey/Site Inspection: X
Surface Geophysical Survey: ____
Monitor Well Installation: X
Monitor Well Sampling: X
Surface Water Sampling: X
Soil Sampling: X
Soil Test Boring: X
Soil Gas Sampling: ____
Hand Augering: ____
Other: ____

PERSONAL PROTECTION:

Level of Protection: A ___ B ___ C ___ D X

Modifications: ____________________

Personal Protective Equipment/Procedures: Tyvek coveralls, hard hats, safety glasses or shields, neoprene gloves, and neoprene steel-toed boots. Respirators will be available in the event waste materials are encountered and organic vapors go above 5 ppm in the breathing zone in the work area.

Surveillance Monitoring Equipment/Procedures: An Organic Vapor Analyzer (OVA) will be used to monitor organic vapors in and around the work area.

Work Limitation (Time of Day, etc.): Field work will be conducted during daylight hours only. If air temperature and humidity become excessive, the time of work day and duration of work time may be limited due to heat stress potential.

DECONTAMINATION AND DISPOSAL PROCEDURES:

Decontamination Equipment/Procedures: High pressure water with detergent is required for cleaning all drilling equipment between each soil test boring and monitor well site. All sampling equipment including gloves used in sample handling will be cleaned with tap water and detergent and rinsed in deionized water between each sampling event. Boots and other field equipment will be cleaned on a daily basis. Tyvek coveralls will be disposed of in plastic garbage bags at the close of each day.

Decontamination Facilities/Designated Areas: All steam cleaning will be conducted at AFB car wash facility on Curtiss Avenue. Runoff from the cleaning process is diverted through an oil/water separator.

Contaminated Sample Disposal Procedures: All soil samples determined to be contaminated by OVA screening will be contained in 55 gallon drums and will be disposed of by the USAF. Obviously contaminated water will be containerized for subsequent disposal.

Contaminated Sample Disposal Facilities/Designated Areas: The USAF will handle the disposal of all contaminated soil samples not transported to laboratories for analysis. It is anticipated that potentially contaminated water containerized from the monitoring well-development process may be disposed of in oil water separators on base, pending base examination and approval.

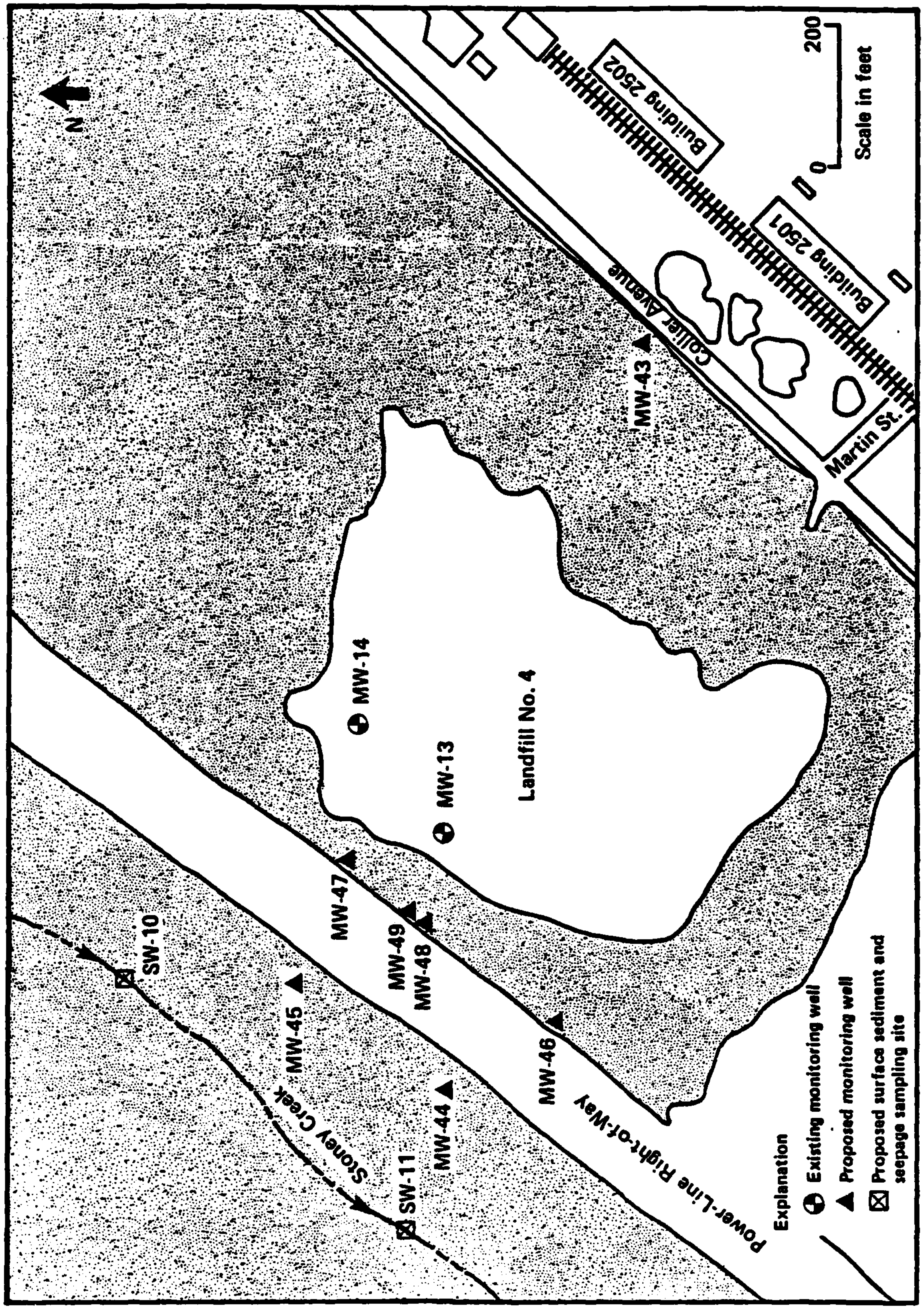


Figure A-3. Site 2.

SITE SAFETY PLAN

LANDFILL NO. 1

(SITE 3)

GENERAL INFORMATION

PROJECT NAME: Seymour Johnson AFB **RTI PROJECT NO.** 432U-2676-16

SITE: Landfill No. 1 (Site No. 3)

PLAN PREPARED BY: R. W. Pratt **DATE:** 8/11/86

REVIEWED BY: W. J. Alaxander **DATE:** 9/9/86

INVESTIGATION OBJECTIVE(S): Collece water sample from existing monitor well MW-12.

PROPOSED DATE OF INVESTIGATION: October/November 1986

SUMMARY OF OVERALL HAZARD: **Serious:** ___ **Moderate:** ___ **Low:** X **Unknown:** ___

SITE HISTORY & DESCRIPTION

SITE DESCRIPTION: Landfill No. 1 is located northwest of Fire Training Area No. 3 and southeast of Stoney Creek (Figure A-4). The total site area is about 2.5 acres. The site is relatively flat and covered with grass and weeds. The topography drops off steeply (about 20 feet) between the landfill and Stoney Creek.

ACTIVITIES PERFORMED ON SITE PRIOR TO INVESTIGATION: The landfill site was active from 1941 to 1946. In recent years an excavation training program was conducted in the landfill area. These excavations uncovered some of the landfill debris.

PREVIOUS STUDIES PERFORMED: IRP-Phase I Report (July 1982) and IRP-Phase II, Stage I Report (July 1985).

UNUSUAL FEATURES (Containers, Buildings, Buried and Above Ground Utilities, Bodies of Water, Terrain): There are above ground power lines that trend in a northeast-southwest direction along the northwest section of the landfill.

WASTE CHARACTERISTICS

WASTE TYPES: Liquid: X Solid: X Sludge: ___ Gas: ___

CHARACTERISTICS: Toxic: ___ Volatile: X Ignitable: X
Radioactive: ___ Reactive: ___ Corrosive: ___

KNOWN OR SUSPECTED SUBSTANCES ON SITE:

Total Organic Carbon (TOC)

PHYSICAL HAZARDS: Heat: ___ Cold: ___ Noise: ___
Radiation: ___ Other (Specify): ___

Comments:

HAZARD EVALUATION

Only water samples will be taken from an existing monitor well on this site. No subsurface drilling activity is planned. Previous analysis of water samples taken from this well indicate only slightly elevated concentrations of TOC in the groundwater. Therefore, it is anticipated that no unusual levels of personnel protection (beyond Level D) will be required. If hazardous materials are suspected or encountered during the course of the of the field work, this plan will be amended and additional precautionary measures will be implemented.

PERIMETER ESTABLISHED: Site Map/Sketch Attached: Yes

Perimeter Identified: Yes Site Fenced Off/Secured: No

Contaminated Areas Identified: Yes

Comments:

TYPE OF WORK ACTIVITY TO BE PERFORMED:

Field Survey/Site Inspection: ____ Soil Sampling: ____

Surface Geophysical Survey: ____ Soil Test Boring: ____

Monitor Well Installation: ____ Soil Gas Sampling: ____

Monitor Well Sampling: X Hand Augering: ____

Surface Water Sampling: ____ Other: ____

PERSONAL PROTECTION:

Level of Protection: A ___ B ___ C ___ D X

Modifications:

Personal Protective Equipment/Procedures: Tyvek coveralls, safety glasses or shields, neoprene gloves, and neoprene steel-toed boots. Respirators will be available in the event waste materials are encountered and organic vapors go above 5 ppm in the breathing zone in the work area.

Surveillance Monitoring Equipment/Procedures: An Organic Vapor Analyzer (OVA) will be used to monitor organic vapors in and around the work area.

Work Limitation (Time of Day, etc.):

DECONTAMINATION AND DISPOSAL PROCEDURES:

Decontamination Equipment/Procedures: All sampling equipment including gloves used in sample handling will be cleaned with tap water and detergent and rinsed in deionized water between each sampling event. Boots and other field equipment will be cleaned on a daily basis. Tyvek coveralls will be disposed of in plastic garbage bags at the close of each day.

Decontamination Facilities/Designated Areas: N/A

Contaminated Sample Disposal Procedures: N/A

Contaminated Sample Disposal Facilities/Designated Areas: N/A

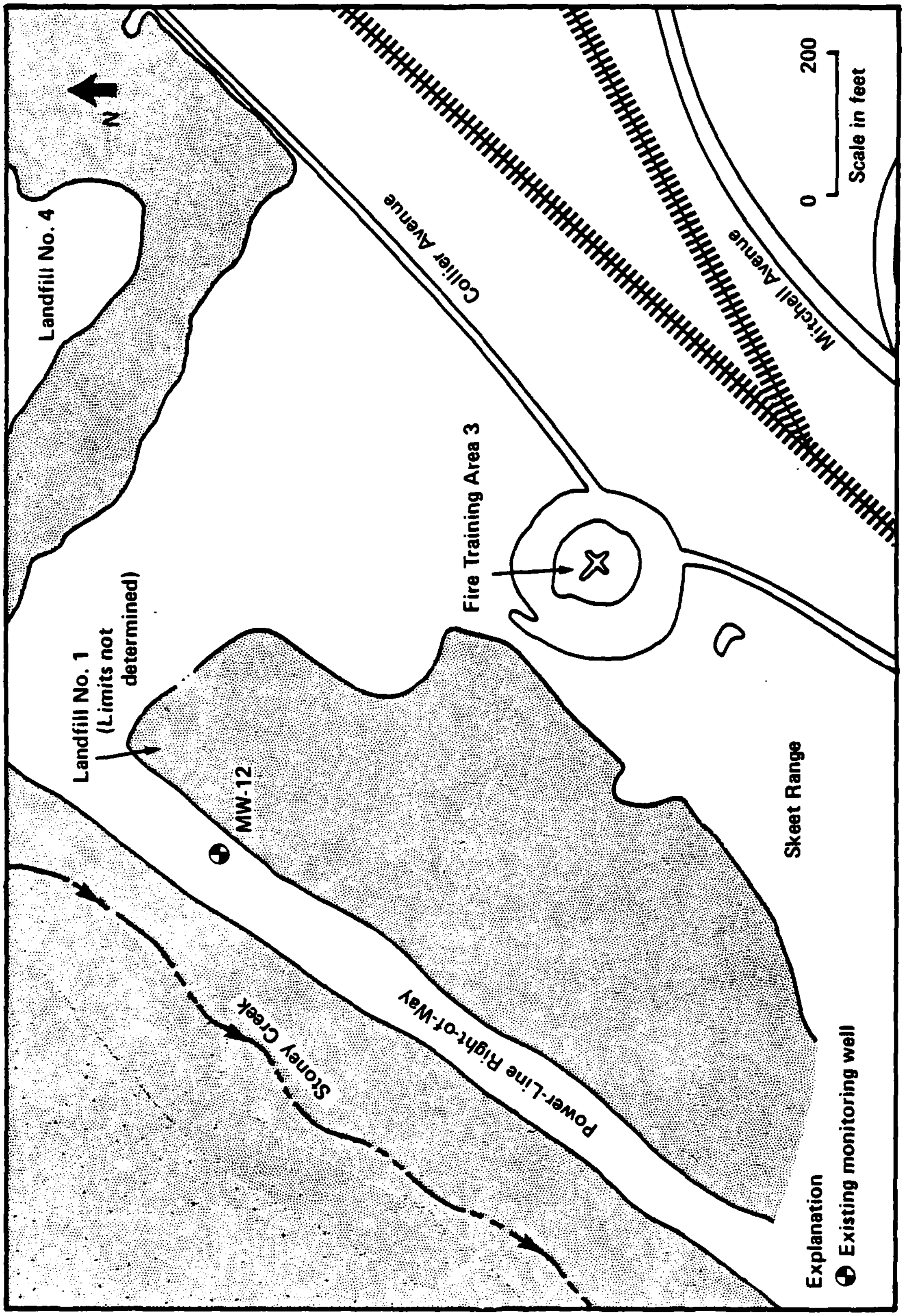


Figure A-4. Site 3.

SITE SAFETY PLAN

LANDFILL NO. 3

(SITE 4)

RESEARCH TRIANGLE INSTITUTE
FIELD INVESTIGATION TEAM
SITE SAFETY PLAN

GENERAL INFORMATION

PROJECT NAME: Seymour Johnson AFB **RTI PROJECT NO.** 432U-2676-16

SITE: Landfill No. 3 (Site 4)

PLAN PREPARED BY: R. W. Pratt **DATE:** 8/11/86

REVIEWED BY: W. J. Alexander **DATE:** 9/9/86

INVESTIGATION OBJECTIVE(S): Conduct subsurface investigation to assess the potential ground water contamination eminating from the landfill.

PROPOSED DATE OF INVESTIGATION: October/November 1986

SUMMARY OF OVERALL HAZARD: Serious: ___ Moderate: ___ Low: X Unknown: ___

SITE HISTORY & DESCRIPTION

SITE DESCRIPTION: The site is located along the northern periphery of the Air Force Base, northwest of the intersection of Biggs Street and Ream Street (Figure A-5) The landfill is relatively flat and encoumpasses an area of approximately 15 acres. The topography slopes steeply west of the landfill toward Stoney Creek.

ACTIVITIES PERFORMED ON SITE PRIOR TO INVESTIGATION: The landfill was operated from 1961 to 1970. The site has been covered with grass.

PREVIOUS STUDIES PERFORMED: IRP-Phase I Report (July 1982).

UNUSUAL FEATURES (Containers, Buildings, Buried and Above Ground Utilities, Bodies of Water, Terrain): There are above ground power lines traversing in a north-south direction between the west edge of the landfill and Stoney Creek.

WASTE CHARACTERISTICS

WASTE TYPES: Liquid: X Solid: X Sludge: ___ Gas: ___

CHARACTERISTICS: Toxic: X Volatile: X Ignitable: ___ Radioactive: ___ Reactive: ___ Corrosive: ___

KNOWN OR SUSPECTED SUBSTANCES ON SITE:

Paint Residues (Suspected)

Oil and Grease (Suspected)

Metals (Suspected)

Solvents (Suspected)

PHYSICAL HAZARDS: Heat: X Cold: ___ Noise: ___ Radiation: ___ Other (Specify): ___

Comments: (See work limitations - page A-26)

HAZARD EVALUATION

Samples to be collected during this site investigation will be taken upgradient and downgradient from the landfill and are expected to be classified as environmental soil/ water samples. Based on historical data from previous investigations, the landfill was used to dispose of general refuse. No fuels, oils, or industrial solvents were to have been disposed of in this land-fill. Therefore, on the basis of the Phase I, IRP Report findings, it is anticipated that unusual levels of personnel protection (beyond Level D) will be required. If hazardous materials are suspected or encountered during the course of the field work, this plan will be amended and additional precautionary measures will be implemented.

PERIMETER ESTABLISHED: **Site Map/Sketch Attached:** Yes

Perimeter Identified: No **Site Fenced Off/Secured:** No

Contaminated Areas Identified: Yes

Comments: ______

TYPE OF WORK ACTIVITY TO BE PERFORMED:

Field Survey/Site Inspection: X

Surface Geophysical Survey: ___

Monitor Well Installation: X

Monitor Well Sampling: X

Surface Water Sampling: ___

Soil Sampling: X

Soil Test Boring: X

Soil Gas Sampling: ___

Hand Augering: ___

Other: ___

PERSONAL PROTECTION:

Level of Protection: A ___ B ___ C ___ D X

Modifications: ______

Personal Protective Equipment/Procedures: Tyvek coveralls, hard hats, safety glasses or shields, neoprene gloves, and neoprene steel-toed boots. Respirators will be available in the event waste materials are encountered and organic vapors go above 5 ppm in the breathing zone in the work area.

Surveillance Monitoring Equipment/Procedures: An Organic Vapor Analyzer (OVA) will be used to monitor organic vapors in and around the work area

Work Limitation (Time of Day, etc.): Field work will be conducted during daylight hours only. If air temperature and humidity become excessive, the time of work day and duration of work time may be limited due to heat stress potential.

DECONTAMINATION AND DISPOSAL PROCEDURES:

Decontamination Equipment/Procedures: High pressure water with detergent is required for cleaning all drilling equipment between each soil test boring and monitor well site. All sampling equipment including gloves used in sample handling will be cleaned with tap water and detergent and rinsed in deionized water between each sampling event. Boots and other field equipment will be cleaned on a daily basis. Tyvek coveralls will be disposed of in plastic garbage bags at the close of each day.

Decontamination Facilities/Designated Areas: All steam cleaning will be conducted at AFB car wash facility on Curtiss Avenue. Runoff from the cleaning process is diverted through an oil/water separator.

Contaminated Sample Disposal Procedures: All soil samples determined to be contaminated by OVA screening will be contained in 55 gallon drums and will be disposed of by the USAF. Obviously contaminated water will be containerized for subsequent disposal.

Contaminated Sample Disposal Facilities/Designated Areas: The USAF will handle the disposal of all contaminated soil samples not transported to laboratories for analysis. It is anticipated that potentially contaminated water containerized from the monitoring well-development process may be disposed of in oil water separators on base, pending base examination and approval.

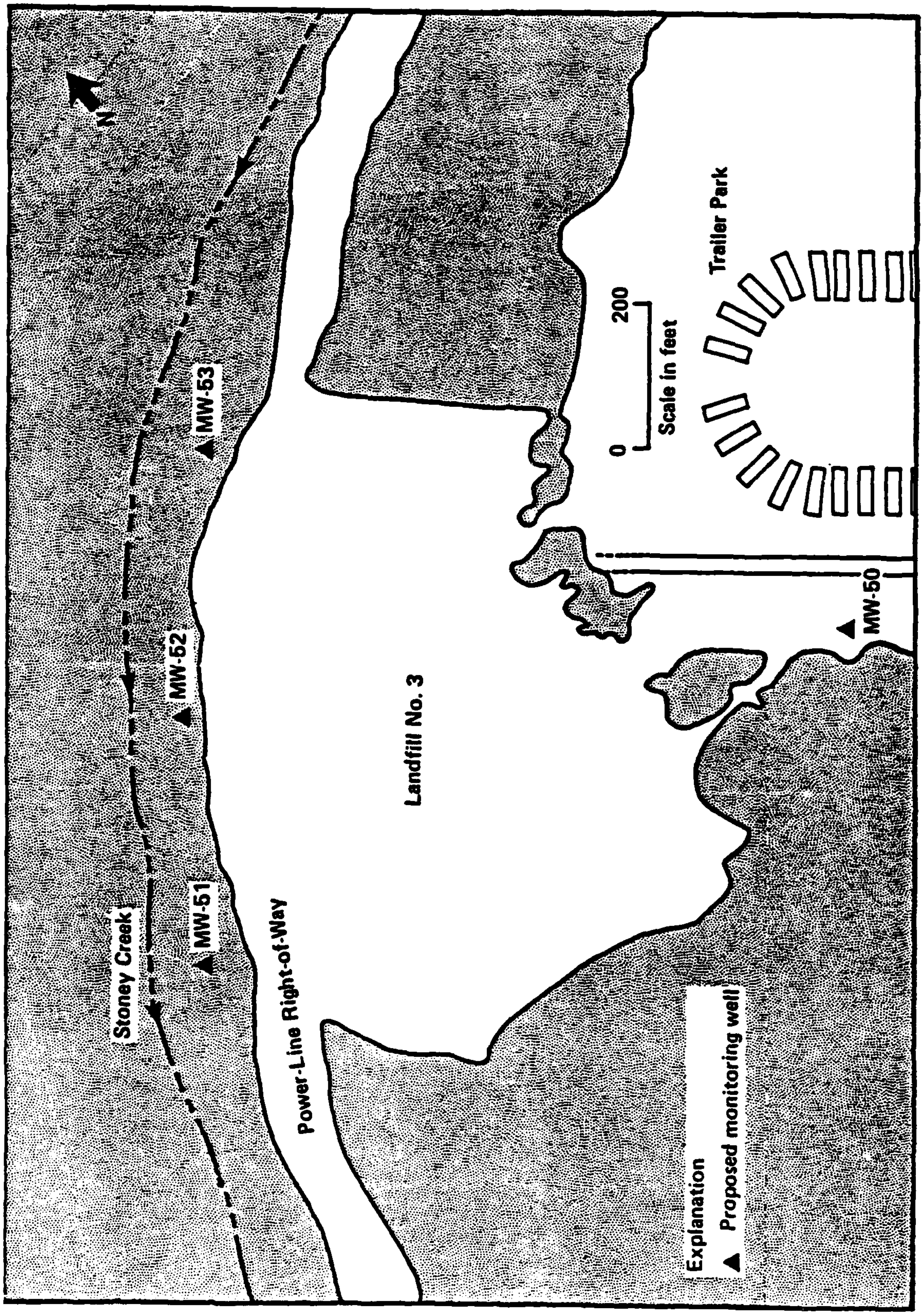


Figure A-5. Site 4.

SITE SAFETY PLAN

DPDO STORAGE AREA

(SITE 5)

GENERAL INFORMATION

PROJECT NAME: Seymour Johnson AFB **RTI PROJECT NO.** 432U-2676-16

SITE: DPDO Hazardous Waste Tank - Storage Area (Site No. 5)

PLAN PREPARED BY: R. W. Pratt **DATE:** 8/11/86

REVIEWED BY: W. J. Alexander **DATE:** 9/9/86

INVESTIGATION OBJECTIVE(S): Conduct subsurface investigation to assess the potential groundwater contamination eminating from the DPDO tank storage area.

PROPOSED DATE OF INVESTIGATION: October/November 1986

SUMMARY OF OVERALL HAZARD: Serious: ___ Moderate: ___ Low: X Unknown: ___

SITE HISTORY & DESCRIPTION

SITE DESCRIPTION: This site is located on the northern section of the base, just south of Fickel Street (Figure A-6). The storage area is enclosed by fence. An underground storage tank exists at the site. The topography is relatively flat in the fenced storage area, but slopes steeply west of the site toward Stoney Creek.

ACTIVITIES PERFORMED ON SITE PRIOR TO INVESTIGATION: The underground storage tank has been used to store waste oils, waste solvents, and pesticides.

PREVIOUS STUDIES PERFORMED: IRP-Phase I Report (July 1982) and IRP-Phase II, Stage I Report (July 1985).

UNUSUAL FEATURES (Containers, Buildings, Buried and Above Ground Utilities, Bodies of Water, Terrain): The terrain where the investigation is planned is about 10-20 feet lower than the hazardous waste storage area.

WASTE CHARACTERISTICS

WASTE TYPES: Liquid: X Solid: X Sludge: ___ Gas: ___

CHARACTERISTICS: Toxic: X Volatile: X Ignitable: X
Radioactive: ___ Reactive: ___ Corrosive: ___

KNOWN OR SUSPECTED SUBSTANCES ON SITE:

Oil and Grease

Lead

Chromium

Pesticides (Suspected)

Paints and Solvents (Suspected)

PHYSICAL HAZARDS: Heat: X Cold: ___ Noise: ___
Radiation: ___ Other (Specify): ___

Comments: See Work Limitations - Page A-32)

HAZARD EVALUATION

Samples to be collected during this site investigation will be taken a few hundred feet downgradient from the hazardous waste disposal tank area and are expected to be classified as environmental soil/water samples. Previous studies in the disposal tank area indicated the presence of relatively low concentrations of substances listed above. Therefore, on the basis of Phase II, Stage I IRP Report findings, it is anticipated that no unusual levels of personnel protection (beyond Level D) will be required. If hazardous materials are suspected or encountered during the course of the field work, this plan will be amended and additional precautionary measures will be implemented.

SITE SAFETY WORK PLAN

PERIMETER ESTABLISHED: Site Map/Sketch Attached: Yes
Perimeter Identified: Yes Site Fenced Off/Secured: No
Contaminated Areas Identified: Yes

Comments: ______

TYPE OF WORK ACTIVITY TO BE PERFORMED:

Field Survey/Site Inspection: X
Surface Geophysical Survey: ___
Monitor Well Installation: X
Monitor Well Sampling: X
Surface Water Sampling: ___
Soil Sampling: X
Soil Test Boring: X
Soil Gas Sampling: ___
Hand Augering: ___
Other: ___

PERSONAL PROTECTION:

Level of Protection: A ___ B ___ C ___ D X

Modifications: ______

Personal Protective Equipment/Procedures: Tyvek coveralls, hard hats, safety glasses or shields, neoprene gloves, and neoprene steel-toed boots. Respirators will be available in the event waste materials are encountered and organic vapors go above 5 ppm in the breathing zone in the work area.

Surveillance Monitoring Equipment/Procedures: An Organic Vapor Analyzer (OVA) will be used to monitor organic vapors in and around the work area.

Work Limitation (Time of Day, etc.): Field work will be conducted during daylight hours only. If air temperature and humidity become excessive, the time of work day and duration of work time may be limited due to heat stress potential.

DECONTAMINATION AND DISPOSAL PROCEDURES:

Decontamination Equipment/Procedures: High pressure water with detergent is required for cleaning all drilling equipment between each soil test boring and monitor well site. All sampling equipment including gloves used in sample handling will be cleaned with tap water and detergent and rinsed in deionized water between each sampling event. Boots and other field equipment will be cleaned on a daily basis. Tyvek™ coveralls will be disposed of in plastic garbage bags at the close of each day.

Decontamination Facilities/Designated Areas: All steam cleaning will be conducted at AFB car wash facility on Curtiss Avenue. Runoff from the cleaning process is diverted through an oil/water separator.

Contaminated Sample Disposal Procedures: All soil samples determined to be contaminated by OVA screening will be contained in 55 gallon drums and will be disposed of by the USAF. Obviously contaminated water will be containerized for subsequent disposal.

Contaminated Sample Disposal Facilities/Designated Areas: The USAF will handle the disposal of all contaminated soil and water samples not transported to laboratories for analysis. It is anticipated that potentially contaminated water containerized from the monitoring well-development process may be disposed of in oil water separators on base, pending base examination and approval.

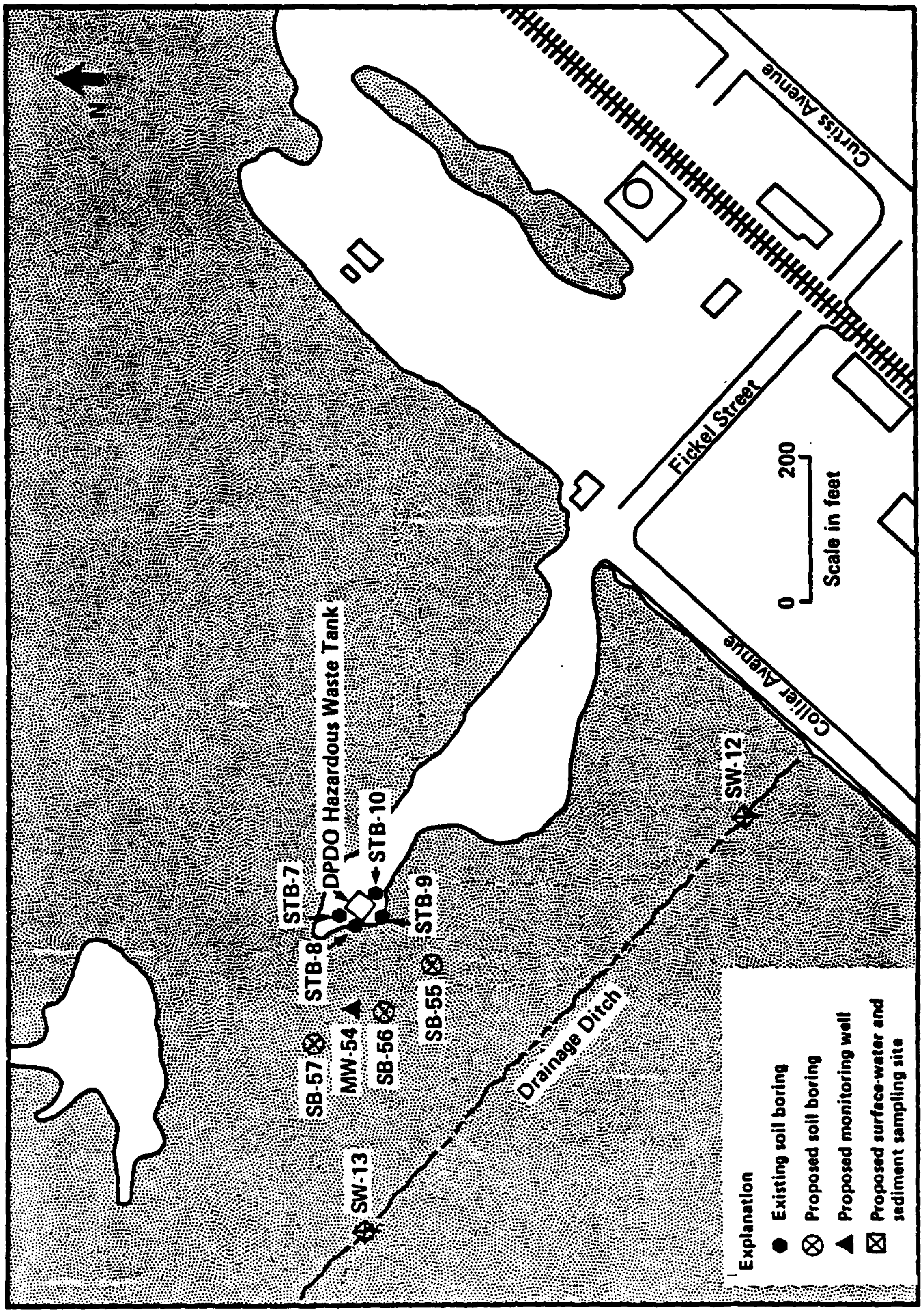


Figure A-6. Site 5.

SITE SAFETY PLAN

COAL PILE AREA

(SITE 6)

GENERAL INFORMATION

PROJECT NAME: Seymour Johnson AFB **RTI PROJECT NO.** 432U-2676-16

SITE: Coal Pile Area (Site No. 6)

PLAN PREPARED BY: R. W. Pratt **DATE:** 8/11/86

REVIEWED BY: W. J. Alexander **DATE:** 9/9/86

INVESTIGATION OBJECTIVE(S): Conduct subsurface investigation to assess the potential soil contamination from the past coal pile storage.

PROPOSED DATE OF INVESTIGATION: October 1986

SUMMARY OF OVERALL HAZARD: Serious: ___ **Moderate:** ___ **Low:** X **Unknown:** ___

SITE HISTORY & DESCRIPTION

SITE DESCRIPTION: The site is a large relatively flat open area mostly devoid of surface vegetation. The area is approximately 300 feet long by 300 feet wide and is located adjacent to the Air Force Base heating plant. The location of the site is shown in Figure A-7.

ACTIVITIES PERFORMED ON SITE PRIOR TO INVESTIGATION: The site was used to stockpile coal for the Air Force Base heating plant prior to converting to oil as fuel. Currently depleted coal pile with some surface coal remaining.

PREVIOUS STUDIES PERFORMED: IRP-Phase I Report (July 1982).

UNUSUAL FEATURES (Containers, Buildings, Buried and Above Ground Utilities, Bodies of Water, Terrain): Possible buried utilities in this area. Drillers will be alert for possible buried utilities.

WASTE CHARACTERISTICS

WASTE TYPES: Liquid: ___ Solid: X Sludge: ___ Gas: ___

CHARACTERISTICS: Toxic: X Volatile: ___ Ignitable: ___
Radioactive: ___ Reactive: ___ Corrosive: ___

KNOWN OR SUSPECTED SUBSTANCES ON SITE:

Coal and associated hydrocarbons

Metals (Suspected)

PHYSICAL HAZARDS: Heat: X Cold: ___ Noise: ___
Radiation: ___ Other (Specify): ___

Comments: (See Work Limitations - page A-38)

HAZARD EVALUATION

Samples to be collected from this site are expected to be classified as environmental soil samples. Previous studies performed in this area indicated only small amounts of coal residues at the land surface and no metal concentration above background levels. Therefore, on the basis of the Phase I, IRP Report findings, it is anticipated that no unusual levels of personnel protection (beyond Level D) will be required. If hazardous materials are suspected or encountered during the course of the field work, this plan will be amended and additional precautionary measures will be implemented.

SITE SAFETY WORK PLAN

SITE 6

PERIMETER ESTABLISHED: **Site Map/Sketch Attached:** Yes
Perimeter Identified: Yes **Site Fenced Off/Secured:** No
Contaminated Areas Identified: Yes

Comments:

TYPE OF WORK ACTIVITY TO BE PERFORMED:

Field Survey/Site Inspection: X
Surface Geophysical Survey:
Monitor Well Installation:
Monitor Well Sampling:
Surface Water Sampling:
Soil Sampling: X
Soil Test Boring: X
Soil Gas Sampling:
Hand Augering:
Other:

PERSONAL PROTECTION:

Level of Protection: A ___ B ___ C ___ D X

Modifications:

Personal Protective Equipment/Procedures: Tyvek coveralls, hard hats, safety glasses or shields, neoprene gloves, and neoprene steel-toed boots. Respirators will be available in the event waste materials are encountered and organic vapors go above 5 ppm in the breathing zone in the work area.

Surveillance Monitoring Equipment/Procedures: An Organic Vapor Analyzer (OVA) will be used to monitor organic vapors in and around the work area.

Work Limitation (Time of Day, etc.): Field work will be conducted during daylight hours only. If air temperature and humidity become excessive, the time of work day and duration of work time may be limited due to heat stress potential.

DECONTAMINATION AND DISPOSAL PROCEDURES:

Decontamination Equipment/Procedures: High pressure water with detergent is required for cleaning all drilling equipment between each soil test boring. All sampling equipment including gloves used in sample handling will be cleaned with tap water and detergent and rinsed in deionized water between each sampling event. Boots and other field equipment will be cleaned on a daily basis. Tyvek coveralls will be disposed of in plastic garbage bags at the close of each day.

Decontamination Facilities/Designated Areas: All high pressure water cleaning will be conducted at the AF Base car wash facility located on Curtiss Avenue. Runoff from the cleaning process will be diverted through an oil/water separator.

Contaminated Sample Disposal Procedures: All soil samples determined to be contaminated by OVA screening will be contained in 55 gallon drums or tanks and will be disposed of by the USAF.

Contaminated Sample Disposal Facilities/Designated Areas: The USAF will handle the disposal of all contaminated soil samples not transported to laboratories for analysis.

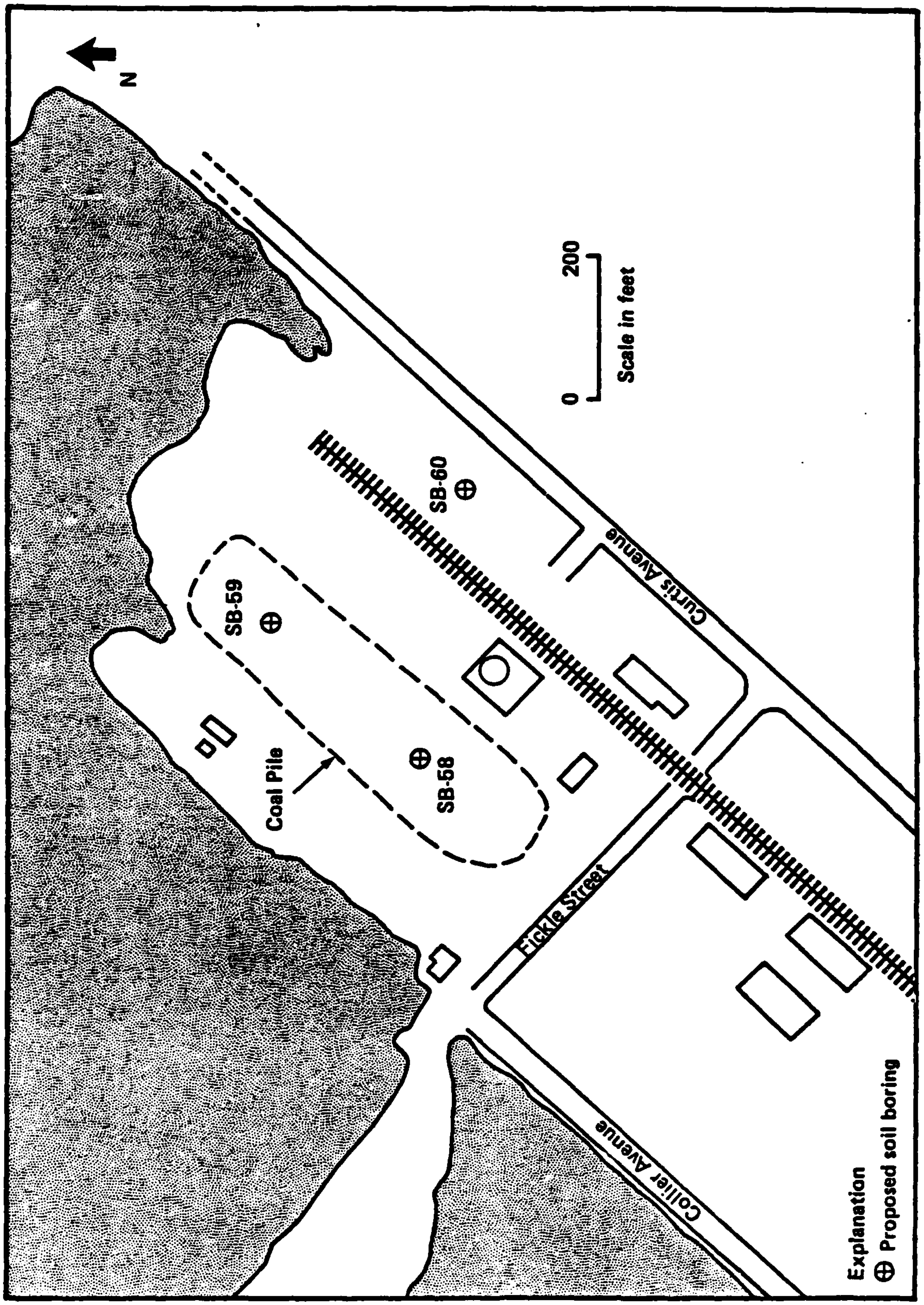


Figure A-7. Site 6.

EMERGENCY INFORMATION

LOCAL SOURCES OF ASSISTANCE:

HOSPITAL: **Name** Seymour Johnson Air Force Base Hospital

Address Wright Avenue

Phone 736-5577

Directions: (See attached Figure for the location of the hospital relative to the investigative site.)

AMBULANCE (Name and Phone): Base Emergency 736-5577

FIRE DEPARTMENT (Name and Phone): Base 736-5117

LOCAL POLICE (Name and Phone): 736-4933

STATE POLICE (Phone):

SITE CONTACTS TO BE NOTIFIED:

Capt. Steve Warren (919) 736-5556 and 736-5557 USAF Hospital/SGFB

Mr. Donny E. Jones (919) 736-6501 4CSG/DEEV

OTHER SOURCES OF ASSISTANCE:

RTI - W. J. Alexander (Project Leader) 919-541-7025

RTI - Bob Uhorchak (RTI Safety Coordinator) 919-541-6978

RTI - Rick Pratt (Project Safety Officer) 919-541-7137

Duke University Occupational Health Service (24 hours)
919-684-8111

APPENDIX B

STATEMENT OF WORK

NOT REPRODUCED IN THIS SECTION OF TECHNICAL OPERATIONS PLAN.

REFER TO APPENDIX A FOR COPY OF STATEMENT OF WORK.

APPENDIX E

LITHOLOGIC DESCRIPTIONS OF SOIL SAMPLES COLLECTED DURING THE DRILLING PROGRAM

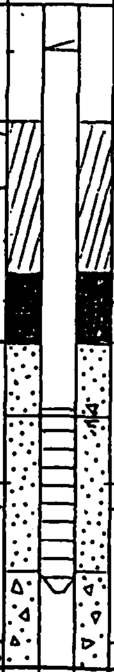
TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: SJAFB (Fire Training Area) DATE DRILLED: 23 OCT 86 COMPLETION DATE: 24 OCT 86

MONITORING WELL NO: MW-40 DRILLING METHOD: 3¼ inch Hollow Stem Augers

DEVELOPMENT: Surge block, overpumping (ave ≈ 5.20 gallons per minute)

DATE(S) DEV.: 10-24-86 - 10-15-86 STATIC WATER LEVEL: 9.64' (TOP OF CASING) MEASURED ON: 22 DEC 86

ELEV. (ft)	DEPTH (ft)	PEN.* RES. (ft)	SAMPLE DESCRIPTION	WELL DESIGN	OVA (ppm)
93.74	+1.97				
91.77	0				
		12	Light brown, organic, silty, fine SAND		B.D.
		10	Red-brown clayey medium to coarse SAND with some medium GRAVEL.		
		14			B.D
86.77	-5	28			
		13	Red-brown, dense very sandy CLAY laminated with light brown coarse to medium SAND.		
		10			B.D.
81.77	-10	3			
		9	White mottled red, slightly silty coarse to medium SAND thinly laminated with rust-red sandy CLAY with medium GRAVEL.		
		1			B.D.
		19	Dense gray CLAY thinly laminated with coarse SAND		
76.77	-15		Boring terminated @ 15ft below ground surface.		
71.77	-20				

Solid 2" PVC Grout Seal Screened 2" PVC Bentonite Seal Gravel Pack NATURAL CAVE

*Penetration Resistance = The Number of Blows Required to Drive an 18 In. Split-Spoon Sampler In. into the Ground Using a Weight of 150 lbs. Falling Freely from a Height of 30 In.

BD - Below Detection

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: SJAFB (Fire Training Area) DATE DRILLED: 24 OCT 86 COMPLETION DATE: 24 OCT 86

MONITORING WELL NO: MW-41 DRILLING METHOD: 3¼ inch I.D. Hollow Stem Auger

DEVELOPMENT: Surge block, overpumping (Q ≅ 0.64 gallons per minute)

DATE(S) DEV.: 24 OCT 86, 21 NOV 86 STATIC WATER LEVEL: 9.67 ft (TOP OF CASING) MEASURED ON: 22 DEC 86

ELEV. (ft)	DEPTH (ft)	PEN.* RES. (ft)	SAMPLE DESCRIPTION	WELL DESIGN	OVA (ppm)
91.52	+2.2				
89.31	0	5			1.0
87.31	-2	3	Light to dark brown, medium to coarse slightly silty SAND with medium to fine GRAVEL thinly laminated with brown silty CLAY.		2.5
85.31	-4	3			6
		17			5.5
83.31	-6	29	Light brown and gray coarse silty SAND grading to red-brown clayey very coarse SAND with fine to medium GRAVEL.		4
81.31	-8	17			7.5
79.31	-10	14	Black dense silty CLAY laminated with clean medium white to gray SAND. (sands saturated)		500
		21			300
77.31	-12				

Boring terminated @ 12.0 ft below ground surface

| Solid 2" PVC | Grout Seal | Screened 2" PVC | Bentonite Seal | Gravel Pack

*Penetration Resistance = The Number of Blows Required to Drive an 18 in. Split-Spoon Sampler 12 in. Into the Ground Using a Weight of 150 lbs. Falling Freely from a Height of 30 in.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: S.AFB (Fire Training Area) DATE DRILLED: 3 NOV 86 COMPLETION DATE: 1 NOV 86

MONITORING WELL NO: MW-42 DRILLING METHOD: 3 ¼ inch I.D Hollow Stem Auger

DEVELOPMENT: Surge block; overpumping (Q ≅ 0.47 gallons per minute)

DATE(S) DEV.: 4 NOV 86, 21 NOV 86 STATIC WATER LEVEL: 11.92 (TOP OF CASING) MEASURED ON: 22 DEC 86

ELEV. (ft)	DEPTH (ft)	PEN.* RES. (ft)	SAMPLE DESCRIPTION	WELL DESIGN	OVA (ppm)
93.69	+2.40				
91.29	0	14	Brown, fine to medium clayey SAND with oxidized metal fragments and glass shards		BD
		19			BD
87.29	-4	43	Brown, medium to coarse, slightly clayey SAND with coarse to fine GRAVEL and wood fragments.		BD
		27			BD
		26	Light brown coarse SAND laminated with sandy dense gray CLAY.		BD
83.29	-8	40	SAMPLE UNRETRIEVABLE		BD
		60			2
		7	Brown, coarse to medium silty SAND thinly laminated with red micaceous fine clayey SAND.		BD
79.29	-12	29	Black dense CLAY with "peaty" inclusions thinly laminated with white to gray medium to coarse SAND		BD
	13.5		(Black Creek Formation).		
			Boring terminated @ 13.5 ft below ground surface.		
75.29	-16				

| | Solid 2" PVC ▨ Grout Seal ☰ Screened 2" PVC ■ Bentonite Seal ⁙ Gravel Pack

*Penetration Resistance = The Number of Blows Required to Drive an 18 In. Split-Spoon Sampler 12 In. Into the Ground Using a Weight of 150 lbs. Falling Freely from a Height of 30 In.

BD - below detection

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: SJAFB (Landfill 4 Background) DATE DRILLED: 22 OCT 86 COMPLETION DATE: 23 OCT 86

MONITORING WELL NO: MW-4? DRILLING METHOD: 3¼ inch ID Hollow Stem Augers

DEVELOPMENT: [illegible], hand bailer (G.ᵀE 1.0 gallons per minute)

DATE(S) DEV.: [illegible] 1 DEC 86 STATIC WATER LEVEL: 19.45' (TOP OF CASING) MEASURED ON: 22 DEC 86

ELEV. (ft)	DEPTH (ft)	PEN.* RES. (ft)	SAMPLE DESCRIPTION	WELL DESIGN	OVA (ppm)
104.02	+1.25				
102.77	0	13	Brown, poorly sorted, fine to medium, clayey SAND.		<1
		7			
		13			
97.77	-5	23	Red-brown, well sorted, very clayey SAND grading into a coarse, clayey, poorly sorted SAND		<1
		25	Brown, coarse, slightly silty, micaceous SAND with coarse well sorted GRAVEL.		<1
		46			
92.77	-10	27	Brown, fine to medium, moderately sorted red-clayey SAND.		<1
		36			
		9			
		4			
87.77	-15	4			<1
		3			
		4	Lamination of gray-red fine sandy CLAY		
82.77	-20	7	Red-brown, poorly sorted, fine to medium, slightly clayey SAND		<1
		21			
			Boring terminated @ 23.5 ft below ground surface (BGS).		
77.77	-25				

Solid 2" PVC | Grout Seal | Screened 2" PVC | Bentonite Seal | Gravel Pack

*Penetration Resistance = The Number of Blows Required to Drive an 18 In. Split-Spoon Sampler 12 In. Into the Ground Using a Weight of 150 lbs. Falling Freely from a Height of 30 In.

TEST BORING AND WELL CONSTRUCTION RECORD

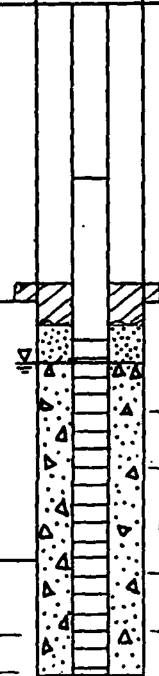
PROJECT: SJAFB (Landfill 4) DATE DRILLED: 4NOV86 COMPLETION DATE: 6NOV86

MONITORING WELL NO: MW 44 DRILLING METHOD: 3¼inch ID. Hollow Stem Augers

DEVELOPMENT: Surge block, overpumping (Q ≥ 0.16 gallons per minute)

DATE(S) DEV.: 6NOV86, 1DEC86 STATIC WATER LEVEL: 5.0' (TOP OF CASING) MEASURED ON: 22 DEC 86

ELEV. (ft)	DEPTH (ft)	PEN.* RES. (ft)	SAMPLE DESCRIPTION	WELL DESIGN	OVA (ppm)
75.76	+3.54				
72.22	0				
		1			
70.22	-2	8	Brown, organic rich, poorly sorted fine to medium SAND		B.D.
68.22	-4	18			4
		26			
66.22	-6	16			B.D.
64.22	-8	24	Dark brown, well sorted, medium to fine SAND and medium to coarse GRAVEL laminated with black silty CLAY.		2
62.22	-10	18			B.D.
		21			
60.22	-12				3
		31	Laminated black silty CLAY and gray fine SAND		B.D
			Boring terminated @ 13.5ft below ground surface.		



| Solid 2" PVC ▨ Grout Seal ▤ Screened 2" PVC ■ Bentonite Seal ⁙ Gravel Pack ~ Plastic Seal ◬ NATURAL CAVE

*Penetration Resistance = The Number of Blows Required to Drive an 18 In. Split-Spoon Sampler 12 In. Into the Ground Using a Weight of 150 lbs. Falling Freely from a Height of 30 In.

TEST BORING AND WELL CONSTRUCTION RECORD

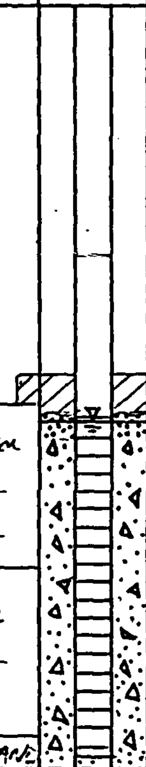
PROJECT: S.JAFB (Landfill 4) DATE DRILLED: 4 NOV 86 COMPLETION DATE: 6 NOV 86

MONITORING WELL NO: MW U5 DRILLING METHOD: 3¼ inch I.D. Hollow Stem Augers

DEVELOPMENT: Surge block, overpumping (@ 6.61 gallons per minute)

DATE(S) DEV.: 6 NOV 86, 19 NOV 86 STATIC WATER LEVEL: 4.50' (TOP OF CASING) MEASURED ON: 22 DEC 86

ELEV. (ft)	DEPTH (ft)	PEN.* RES. (ft)	SAMPLE DESCRIPTION	WELL DESIGN	OVA (ppm)
75.14	+4.10				
71.04	0				
		8	Brown, organic rich, fine to medium moderately sorted SAND with some medium to coarse GRAVEL.		<1
69.04	-2	8			B.D.[a]
67.04	-4	7			
		7	Brown, well sorted, medium to coarse SAND and medium to coarse GRAVEL		B.D.
65.04	-6	8			
		9			B.D.
63.04	-8	10			
		14	Laminated gray silty clay and medium white SAND		1.0
61.04	-10		Boring terminated @ 10ft below ground surface		
59.04	-1.				



| | Solid 2" PVC; Grout Seal; Screened 2" PVC; Bentonite Seal; Gravel Pack; ~ Plastic Seal; NATURAL CAVE

*Penetration Resistance = The Number of Blows Required to Drive an 18 In. Split-Spoon Sampler In. Into the Ground Using a Weight of 150 lbs. Falling Freely from a Height of 30 In.

[a] B.D. Below Detection

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: SJAFB (Landfill 4) DATE DRILLED: 4 NOV 86 COMPLETION DATE: 7 Nov 86

MONITORING WELL NO: MW-4b DRILLING METHOD: 3 1/4 inch I.D. Hollow Stem Augers

DEVELOPMENT: Surge block, overpumping (Q ≅ 11.0 gallons per minute)

DATE(S) DEV.: 7 NOV 86, 18 NOV 86 STATIC WATER LEVEL: 4.40 (TOP OF CASING) MEASURED ON: 22 DEC 86

ELEV. (ft)	DEPTH (ft)	PEN.* RES. (ft)	SAMPLE DESCRIPTION	WELL DESIGN	OVA (ppm)
75.84	3.92				
71.92	0	2			B.D.[@]
69.92	-2	7	Brown, organic, poorly sorted very fine to fine silty SAND, with some medium GRAVEL.		4
					9.5
67.92	-4	13			0.4
65.92	-6	21	Moderately sorted, medium to coarse GRAVEL with poorly sorted very coarse to medium gray clayey SAND.		
63.92	-8	11			B.D.
61.92	-10	27	Black, dense, silty CLAY laminated with well sorted coarse to medium SAND with GRAVEL		B.D.
59.92	-12		Boring terminated @ 10.5 feet below ground surface (BGS)		

| | Solid 2" PVC ▨ Grout Seal ▤ Screened 2" PVC ■ Bentonite Seal ⬚ Gravel Pack
— Plastic Seal △ Natural Cave

*Penetration Resistance = The Number of Blows Required to Drive an 18 In. Split-Spoon Sampler In. Into the Ground Using a Weight of 150 lbs. Falling Freely from a Height of 30 In.

@ BD - Below Detection

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: SJAFB (Landfill 4) DATE DRILLED: 5 NOV 86 COMPLETION DATE: 7 NOV 86

MONITORING WELL NO: MW 47 DRILLING METHOD: 3¼ inch I.D. Hollow Stem Augers

DEVELOPMENT: Surge block overpumping (1.7 ± 9.10 gallons per minute)

DATE(S) DEV.: 7 NOV 86, 20 NOV 86 STATIC WATER LEVEL: 5.25' (TOP OF CASING) MEASURED ON: 22 DEC 86

ELEV. (ft)	DEPTH (ft)	PEN.* RES. (ft)	SAMPLE DESCRIPTION	WELL DESIGN	OVA (ppm)
76.76	+3.88				
72.88	0	1	Black, organic, poorly sorted, very fine silty SAND laminated with a brown silty CLAY.		
70.88	-2	8			10
68.88	-4	15	Gray and brown, moderately sorted coarse to medium, silty SAND and fine to medium GRAVEL.		8.9
66.88	-6	12			
		23			B.D'
64.88	-8	6			
62.88	-10	13			
		15	Brown, moderately sorted, very coarse to medium, clayey SAND with fine to very coarse GRAVEL.		B.D
60.88	-12	18			
			Black dense silty CLAY laminated with fine gray SAND.		
			Boring terminated @ 13.5 ft below ground surface (BGS)		

Solid 2" PVC   Grout Seal   Screened 2" PVC   Bentonite Seal   Gravel Pack

*Penetration Resistance = The Number of Blows Required to Drive an 18 In. Split-Spoon Sampler In. Into the Ground Using a Weight of 150 lbs. Falling Freely from a Height of 30 In.

' B.D. - Below Detection

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: S.J.AFB (Landfill 4) DATE DRILLED: 31 OCT 86 COMPLETION DATE: 31 OCT 86

MONITORING WELL NO: MW 49 DRILLING METHOD: 3¼ inch I.D. Hollow Stem Augers

DEVELOPMENT: Surge block overpumping (@ ≙ 2.50 gallons per minute)

DATE(S) DEV.: 19 NOV 86 STATIC WATER LEVEL: 2.90' (TOP OF CASING) MEASURED ON: 22 DEC 86

ELEV. (ft)	DEPTH (ft)	PEN.* RES. (ft)	SAMPLE DESCRIPTION	WELL DESIGN	OVA (ppm)
75.52	+2.0				
73.52	0	3 9 23	Brown, organic, well sorted, fine to medium silty SAND		B.D.[1]
68.52	-5	25 11 15	Brown, moderately sorted, medium to coarse SAND laminated with medium to coarse GRAVEL lenses.		B.D.
63.52	-10	21 22 24	Black, dense, silty CLAY laminated with fine to medium gray SAND (Black Creek Formation)		3
58.52	-15	23 16	Black, dense, silty CLAY very thinly laminated with very fine white SAND (Black Creek Formation)		B.D.
48.52	-25		Boring terminated @ 25 ft below ground surface		

Solid 2" PVC; Grout Seal; Screened 2" PVC; Bentonite Seal; Gravel Pack; NATURAL CAVE

*Penetration Resistance = The Number of Blows Required to Drive an 18 In. Split-Spoon Sampler 12 In. Into the Ground Using a Weight of 150 lbs. Falling Freely from a Height of 30 In.

[1] BD - Below Detection

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: SJAFB (Landfill 4) DATE DRILLED: 5 NOV 86 COMPLETION DATE: 7 NOV 86

MONITORING WELL NO: MW 49 DRILLING METHOD: 3¼ inch I.D. Hollow Stem Augers

DEVELOPMENT: Surge block overpumping (Q ≅ 0.94 gallons per minute)

DATE(S) DEV.: 7 NOV 86, 19 NOV 86 STATIC WATER LEVEL: 5.00 Ft (TOP OF CASING) MEASURED ON: 22 DEC 86

ELEV. (ft)	DEPTH (ft)	PEN.* RES. (ft)	SAMPLE DESCRIPTION	WELL DESIGN	OVA (ppm)
76.78	+3.90				
72.88	0	1			
70.88	-2	5	Brown and gray, very fine to fine, poorly sorted, silty, slightly clayey SAND.		2
		22			
68.88	-4	16			70
66.88	-6	21	Gray to white and light brown, well sorted medium to coarse SAND with some medium GRAVEL.		10
64.88	-8	24			
			Black silty CLAY laminated with gray fine SAND.		5
6416	-9				
			Well boring terminated @ 9.0 feet below ground surface.		

| | Solid 2" PVC ▨ Grout Seal ▤ Screened 2" PVC ■ Bentonite Seal ~ Plastic Seal ⊡ Gravel Pack ⊡ NATURAL CAVE

*Penetration Resistance = The Number of Blows Required to Drive an 18 In. Split-Spoon Sampler In. Into the Ground Using a Weight of 150 lbs. Falling Freely from a Height of 30 In.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: SJAFB (Landfill 4) DATE DRILLED: 30 OCT 86 COMPLETION DATE: ______

MONITORING WELL NO: Soil boring 49 DRILLING METHOD: Mud Rotary 5 3/4 inch bit

DEVELOPMENT: ______

DATE(S) DEV.: ______ STATIC WATER LEVEL: ______ MEASURED ON: ______

ELEV. (ft)	DEPTH (ft)	PEN.* RES. (ft)	SAMPLE DESCRIPTION	WELL DESIGN	OVA (ppm)
20	60		Black dense, slightly silty CLAY.		
15	65	34			
10	70	38	same as above		
		56			
5	75		Soil boring terminated @ 74.5 feet below ground surface.		

| | Solid 2" PVC ▨ Grout Seal ▤ Screened 2" PVC ■ Bentonite Seal ⁙ Gravel Pack

*Penetration Resistance = The Number of Blows Required to Drive an 18 In. Split-Spoon Sampler In. Into the Ground Using a Weight of 150 lbs. Falling Freely from a Height of 30 In.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: SJAFB (Landfill 4) DATE DRILLED: 30 OCT 86 COMPLETION DATE: ________

MONITORING WELL NO: Soil boring 49 DRILLING METHOD: Mud Rotary 5 3/4 inch bit

DEVELOPMENT: ________

DATE(S) DEV.: ________ STATIC WATER LEVEL: ________ MEASURED ON: ________

ELEV. (ft)	DEPTH (ft)	PEN.* RES. (ft)	SAMPLE DESCRIPTION	WELL DESIGN	OVA (ppm)
50	30	26	"Upper" Black Creek Formation		
45	35	16			
40	40	39	Black, dense, slightly silty CLAY, becoming more thinly laminated (1mm) with depth, with gray, moderately sorted, medium to fine SAND.		
35	45	39			
30	50	42			
25	55	39	"Lower" Black Creek Formation Black, dense, slightly silty CLAY		

| Solid 2" PVC ▨ Grout Seal ▤ Screened 2" PVC ■ Bentonite Seal ⛆ Gravel Pack

*Penetration Resistance = The Number of Blows Required to Drive an 18 In. Split-Spoon Sampler In. Into the Ground Using a Weight of 150 lbs. Falling Freely from a Height of 30 In.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: SJAFB (Landfill 4) DATE DRILLED: 30 OCT 86 COMPLETION DATE: ________

MONITORING WELL NO: Soil boring 49 DRILLING METHOD: Mud Rotary 5 3/4 inch bit

DEVELOPMENT: ________

DATE(S) DEV.: ________ STATIC WATER LEVEL: ________ MEASURED ON: ________

ELEV. (ft)	DEPTH (ft)	PEN.* RES. (ft)	SAMPLE DESCRIPTION	WELL DESIGN	OVA (ppm)
75	5	23	Light brown, well sorted, medium to coarse SAND with medium GRAVEL. (saturated)		
70	10	12	"Upper" Black Creek Formation		
65	15	22	Black, dense, silty clay, laminated with gray poorly sorted very fine SAND with medium to coarse GRAVEL.		
60	20	20			
		16			
			caving - no sample		
55	25	12	"Upper" Black Creek Formation Same as above		

| | Solid 2" PVC ▨ Grout Seal ▤ Screened 2" PVC ■ Bentonite Seal ⬚ Gravel Pack

*Penetration Resistance = The Number of Blows Required to Drive an 18 In. Split-Spoon Sampler In. Into the Ground Using a Weight of 150 lbs. Falling Freely from a Height of 30 In.

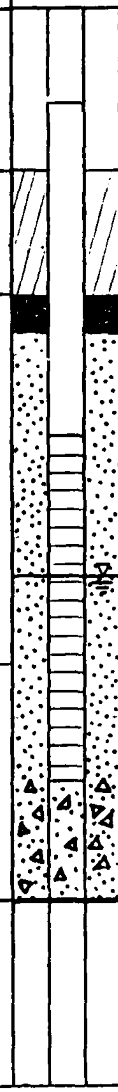
TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: SJAFB (Landfill 3) DATE DRILLED: 15 OCT 86 COMPLETION DATE: [illegible]

MONITORING WELL NO: MW-50 DRILLING METHOD: 3¼ inch Hollow Stem Auger (IL

DEVELOPMENT: Surge block overpumping (≅ 1.6 gallons per minute)

DATE(S) DEV.: 22 OCT 86, 21 NOV 86 STATIC WATER LEVEL: 13.01 (TOP OF CASING) MEASURED ON: 22 Dec 86

ELEV. (ft)	DEPTH (ft)	PEN.* RES. (ft)	SAMPLE DESCRIPTION	WELL DESIGN	OVA (ppm)
100.80	+1.75				
99.05	0	29	Light brown medium to fine clayey SAND with some fine to medium GRAVEL.		B.D.[1]
94.05	-5	48			
		13	Red-brown medium to fine clayey SAND thinly laminated with gray clayey SILT		B.D.
89.05	-10				
84.05	-15	7	Brown, fine to medium micaceous SAND with some fine to medium GRAVEL.		B.D.
79.05	-20	25			
			Terminate boring @ 20.0 ft below ground surface (BGS.) Water level 15 OCT 86 11.31' BGS date drilled.		

| | Solid 2" PVC ▨ Grout Seal ▤ Screened 2" PVC ■ Bentonite Seal ⁘ Gravel Pack [illegible]

*Penetration Resistance = The Number of Blows Required to Drive an 18 In. Split-Spoon Sampler 12 In. into the Ground Using a Weight of 150 lbs. Falling Freely from a Height of 30 In.

[1] B.D. - below detection

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: SJAFB (Landfill 3) DATE DRILLED: 11 NOV 86 COMPLETION DATE: 12 NOV 86

MONITORING WELL NO: MW-31 DRILLING METHOD: 3¼ inch I.D. Hollow Stem Auger

DEVELOPMENT: Surge block pumping (@ 0.74 gallons per minute)

DATE(S) DEV.: 12 NOV 86 18 NOV 86 21 NOV 86 STATIC WATER LEVEL: 4.40' (TOP OF CASING) MEASURED ON: 22 DEC 86

ELEV. (ft)	DEPTH (ft)	PEN.* RES. (ft)	SAMPLE DESCRIPTION	WELL DESIGN	OVA (ppm)
77.20	+4.21				
72.99	0				
		1	Black, organic rich, sandy, very silty CLAY.		20
70.99	-2	7	Gray, medium to fine silty SAND grading to gray very coarse to medium sand with medium GRAVEL.		70
68.99	-4	16			300
		23			100
66.99	-6	26	Green, dense slightly silty CLAY very thinly laminated with white very fine quartz SAND (BLACK CREEK FORMATION)		NO DATA
64.99	-8	18			NO DATA
62.99	-10		Boring terminated @ 9.0ft B.G.S.		
			Water level 11 Nov 86: 0.5 feet below ground surface.		

| | Solid 2" PVC ▨ Grout Seal ▤ Screened 2" PVC ■ Bentonite Seal ⁙ Gravel Pack ~ Plastic Seal ⊡ NATURAL CAVE

*Penetration Resistance = The Number of Blows Required to Drive an 18 In. Split-Spoon Sampler 12 In. Into the Ground Using a Weight of 150 lbs. Falling Freely from a Height of 30 In.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: SJAFB (Landfill 5) DATE DRILLED: 11 NOV 86 COMPLETION DATE: 12 NOV 86

MONITORING WELL NO: MW-52 DRILLING METHOD: 3 1/4 inch I.D. Hollow Stem Augers

DEVELOPMENT: Surge block, overpumping (Q ≅ 2.40 gallons per minute

DATE(S) DEV.: 12NOV86, 14NOV86, 24NOV86 STATIC WATER LEVEL: 4.18' (TOP OF CASING) MEASURED ON: 22 DEC 86

ELEV. (ft)	DEPTH (ft)	PEN.* RES. (ft)	SAMPLE DESCRIPTION	WELL DESIGN	OVA (ppm)
77.49	+3.98				
73.51	0				
		1	Black organic rich very coarse to medium clayey SAND.		10
71.51	-2	1	Gray, poorly sorted fine to very fine SAND grading to moderately sorted gray very coarse to medium SAND with medium GRAVEL.		20
69.51	-4	2			30
		5			
67.51	-6	14	Green, dense, silty CLAY thinly laminated with poorly sorted very fine SAND		20
65.51	-8		Boring terminated @ 7.5ft below ground surface.		
63.51	-10				
			water level at time of boring: 0.58ft below ground surface		

| Solid 2" PVC ▨ Grout Seal ▤ Screened 2" PVC ■ Bentonite Seal ⁙ Gravel Pack ~ Plastic Seal ⁙ Natural Cave

*Penetration Resistance = The Number of Blows Required to Drive an 18 In. Split-Spoon Sampler In. Into the Ground Using a Weight of 150 lbs. Falling Freely from a Height of 30 In.

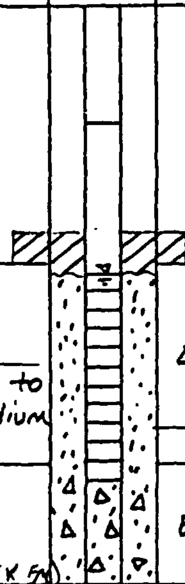
TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: S.J.A.F.B (Landfill 3) DATE DRILLED: 11 NOV 86 COMPLETION DATE: 12 NOV 86

MONITORING WELL NO: MW-53 DRILLING METHOD: 3 1/4 inch I.D. Hollow Stem Augers

DEVELOPMENT: Surge Block, (Q ≅ 3.40 gallons per minute)

DATE(S) DEV.: 12 Nov 86, 14 Nov 86, 24 Nov 86 STATIC WATER LEVEL: 4.20' (Top of Casing) MEASURED ON: 22 Dec 86

ELEV. (ft)	DEPTH (ft)	PEN.* RES. (ft)	SAMPLE DESCRIPTION	WELL DESIGN	OVA (ppm)
-77.60					
-73.52	0				
		2	Dark brown to black organic rich very sandy CLAY		B.D.
-71.52	2	1			
		4.	Dark gray, moderately sorted, medium to coarse, slightly silty SAND with medium GRAVEL.		
-69.52	4	8			15
-67.52	6	8	Green, brittle, slightly silty CLAY thinly laminated with very fine poorly sorted white SAND. (BLACK CREEK FM)		B.D.
-65.52	8	16			
-63.52	10		Boring terminated @ 9' below ground surface		
-61.52	12				
			(Water level 12 Nov 86: 1' below ground surface)		

| Solid 2" PVC ▨ Grout Seal ▤ Screened 2" PVC ■ Bentonite Seal ⊡ Gravel Pack

*Penetration Resistance = The Number of Blows Required to Drive an 18 In. Split-Spoon Sampler In. Into the Ground Using a Weight of 150 lbs. Falling Freely from a Height of 30 In.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: SJAFB (DPDO) DATE DRILLED: 12NOV86 COMPLETION DATE: 13NOV86

MONITORING WELL NO: MW-54, SB-56 DRILLING METHOD: 3¼ inch I.D. Hollow Stem Augers

DEVELOPMENT: Surge block, overpumping (GPM ≅ 0.53 gallons per minute)

DATE(S) DEV.: 13NOV86, 2? NOV 86 STATIC WATER LEVEL: 12.31 ft (TOP OF CASING) MEASURED ON: 22 Dec. 86

ELEV. (ft)	DEPTH (ft)	PEN.* RES. (ft)	SAMPLE DESCRIPTION	WELL DESIGN	OVA (ppm)
88.51	+2.42				
86.09	0	7 (0-2.0)	Brown, medium to coarse, well sorted slightly clayey SAND.		1
		9 (3.5-5.0)			
81.09	-5		Red-Brown, well sorted, medium to coarse SAND with fine to coarse GRAVEL.		NO RECORD
		15 (8-10.0)	Red-Brown, moderately sorted, slightly clayey, medium to fine, micaceous SAND.		1.5
76.09	-10				
		10 (13-15.0)	Brown, moderately sorted, fine to very fine, silty SAND.		B.D
71.09	-15	(16-18.0)	No sample		
68.59	-17.5		Boring terminated @ 17.5 feet below ground surface (BGS)		
			I - soil samples for laboratory analysis		

Solid 2" PVC; Grout Seal; Screened 2" PVC; Bentonite Seal; Gravel Pack

*Penetration Resistance = The Number of Blows Required to Drive an 18 In. Split-Spoon Sampler 12 In. into the Ground Using a Weight of 150 lbs. Falling Freely from a Height of 30 In.

B.D. - Below Detection

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: SJAFB (DPDO) DATE DRILLED: 13 NOV 86 COMPLETION DATE: ______

MONITORING WELL NO: Soil Boring 55 DRILLING METHOD: 3¼ inch Hollow Stem Augers

DEVELOPMENT: ______

DATE(S) DEV.: ______ STATIC WATER LEVEL: 11.40 BGS MEASURED ON: 13 NOV 86

ELEV. (ft)	DEPTH (ft)	PEN.* RES. (ft)	SAMPLE DESCRIPTION	WELL DESIGN: LABORATORY SAMPLES			OVA (ppm)
87.47	0						
85.47	-2	6	Brown to tan, coarse to medium, moderately sorted very clayey SAND terminating into brown, dense, silty CLAY.	1-3'D			B.D.
83.47	-4	9		3-5'D			
81.47	-6		SAMPLE UNRECOVERABLE				
79.47	-8						BD.
77.47	-10	14	Brown, medium to fine, moderately sorted SAND laminated with black very fine SAND and SILT (saturated)	9-11'D			
75.47	-12	16		11-13'D			
73.47	-14	6		13-15'D			
			Soil boring terminated @ 15ft below ground surface (BGS)				
			soil sample interval				

Solid 2" PVC · Grout Seal · Screened 2" PVC · Bentonite Seal · Gravel Pack

*Penetration Resistance = The Number of Blows Required to Drive an 24 In. Split-Spoon Sampler 12 In. Into the Ground Using a Weight of 150 lbs. Falling Freely from a Height of 30 In.

BD - below detection

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: S.JAFB (DPDO) DATE DRILLED: 12NOV86 COMPLETION DATE: 13NOV86

MONITORING WELL NO: MW-54, SB-56 DRILLING METHOD: 3¼ inch I.D. Hollow Stem Augers

DEVELOPMENT: Surge block, overpumping (GPE 0.53 gallons per minute)

DATE(S) DEV.: 13NOV86, 2-NOV86 STATIC WATER LEVEL: 12.31 ft (TOP OF CASING) MEASURED ON: 22 Dec. 86

ELEV. (ft)	DEPTH (ft)	PEN.* RES. (ft)	SAMPLE DESCRIPTION	OVA (ppm)
88.51	+2.42			
86.09	0	7 (0-2.0)	Brown, medium to coarse, well sorted slightly clayey SAND.	1
		9 (3.0-5.0)		
81.09	-5		Red-Brown, well sorted, medium to coarse SAND with fine to coarse GRAVEL.	NO RECORD
		15 (8.0-10.0)	Red-Brown, moderately sorted, slightly clayey, medium to fine, micaceous SAND.	1.5
76.09	-10		Brown, moderately sorted, fine to very fine, silty SAND.	B.D.
		10 (13.5-15.0)		
71.09	-15	(16.0-18.0)	No sample	
68.59	-17.5		Boring terminated @ 17.5 feet below ground surface (BGS)	
			I - Soil samples for laboratory analysis	

| | Solid 2" PVC ▨ Grout Seal ▤ Screened 2" PVC ■ Bentonite Seal ⁙ Gravel Pack

*Penetration Resistance = The Number of Blows Required to Drive an 18 In. Split-Spoon Sampler 12 In. into the Ground Using a Weight of 150 lbs. Falling Freely from a Height of 30 In.

B.D. - Below Detection

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: SJAFB (DPDO) DATE DRILLED: 13 Nov 86 COMPLETION DATE:

MONITORING WELL NO: Soilboring 57 DRILLING METHOD: 3¼ inch Hollow Stem Augers

DEVELOPMENT:

DATE(S) DEV.: STATIC WATER LEVEL: 10.21 BGS MEASURED ON: 13 Nov 86

ELEV. (ft)	DEPTH (ft)	PEN.* RES. (ft)	SAMPLE DESCRIPTION	WELL DESIGN: LABORATORY SAMPLES	OVA (ppm)
84.06	0				
82.06	-2	5	Brown to light brown, moderately sorted, medium to coarse Sand with some fine Gravel.	2-4.0	8
80.06	-4	13		4-6.0	15
78.06	-6				
76.06	-8				
74.06	-10	6	Brown, moderately sorted, medium to coarse very clayey SAND (saturated)	9-11.0	B.D.
72.06	-12	5	Brown, fine to medium, moderately sorted silty SAND laminated with black very silty CLAY (Black Creek Formation)	11-12.0	B.D.

Soil boring terminated @ 13 feet below ground surface (B.G.S.).

| Soil sample interval

| | Solid 2" PVC ▨ Grout Seal ▤ Screened 2" PVC ■ Bentonite Seal ⛆ Gravel Pack

*Penetration Resistance = The Number of Blows Required to Drive an 24 In. Split-Spoon Sampler 12 In. Into the Ground Using a Weight of 150 lbs. Falling Freely from a Height of 30 In.

BD - below detection

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: S.AFB (Coal Storage Area) DATE DRILLED: 14 OCT 86 COMPLETION DATE: ________

MONITORING WELL NO: Soilboring 58 DRILLING METHOD: 3 1/4 inch I.D. Hollow Stem Augers

DEVELOPMENT: ________

DATE(S) DEV.: ________ STATIC WATER LEVEL: dry hole MEASURED ON: 15 OCT 86

ELEV. (ft)	DEPTH (ft)	PEN.* RES. (ft)	SAMPLE DESCRIPTION	WELL DESIGN: LABORATORY SAMPLES	OVA (ppm)
103.95	0				
101.95	-2	46	Brown, moderately to well sorted, medium to fine clayey SAND with medium to coarse GRAVEL.	1'-2.5'A	
99.95	-4	16		3.5'-5.0'A	B.D.
97.95	-6				
95.95	-8				
93.95	-10	24		8.5'-10'A	
			Soilboring terminated @ 10 feet below ground surface (BGS.)		
			[soil sample interval		

| | Solid 2" PVC · Grout Seal · Screened 2" PVC · Bentonite Seal · Gravel Pack

*Penetration Resistance = The Number of Blows Required to Drive an 18 In. Split-Spoon Sampler 12 In. Into the Ground Using a Weight of 150 lbs. Falling Freely from a Height of 30 In.

B.D - below detection

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: S.AFB Coal Storage Area DATE DRILLED: 14 OCT 86 COMPLETION DATE: ________

MONITORING WELL NO: Soil boring 59 DRILLING METHOD: 3¼ inch I.D. Hollow Stem Augers

DEVELOPMENT: ________

DATE(S) DEV.: ________ STATIC WATER LEVEL: dry hole MEASURED ON: 15 OCT 86

ELEV. (ft)	DEPTH (ft)	PEN.* RES. (ft)	SAMPLE DESCRIPTION	WELL DESIGN (LABORATORY SAMPLES)	OVA (ppm)
103.89	0				
101.89	-2	26	Gray, fine to medium, moderately sorted, very silty SAND.	1.0'-2.5'A	B.D.
99.89	-4	14		3.5'-5.0'A	
97.89	-6		Brown, coarse to medium, moderately sorted, very clayey SAND with medium to fine GRAVEL.		B.D
95.89	-8	36		8.5'-10'A	
93.89	-10		Soil boring terminated @ 10 feet below ground surface.		

soil sample interval

| Solid 2" PVC ▨ Grout Seal ▤ Screened 2" PVC ■ Bentonite Seal ⬚ Gravel Pack

*Penetration Resistance = The Number of Blows Required to Drive an 18 In. Split-Spoon Sampler 12 In. Into the Ground Using a Weight of 150 lbs. Falling Freely from a Height of 30 In.

BD - below detection

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: SJAFB (Coal Storage Area) DATE DRILLED: 14 OCT 86 COMPLETION DATE: ______

MONITORING WELL NO: Soilboring 60 DRILLING METHOD: 3¼ inch I.D. Hollow Stem Augers

DEVELOPMENT: ______

DATE(S) DEV.: ______ STATIC WATER LEVEL: dry hole MEASURED ON: 15 OCT 86

ELEV. (ft)	DEPTH (ft)	PEN.* RES. (ft)	SAMPLE DESCRIPTION	WELL DESIGN	OVA (ppm)
				LABORATORY SAMPLE(S)	
102.04	0				
100.04	-2	15	Brown, coarse to medium, moderately sorted, very clayey SAND	1-2.5	B.D
98.04	-4	29		2.5-4	
96.04	-6		Brown, coarse, moderately sorted SAND with some fine to medium GRAVEL		B.D
94.04	-8				
92.04	-10	15	Gray, coarse to medium well sorted, clayey SAND with some medium GRAVEL	8.5-10	
			Soil boring terminated @10 feet below ground surface (BGS).		
			I Soil sample interval		

| | Solid 2" PVC ▨ Grout Seal ▤ Screened 2" PVC ■ Bentonite Seal ⛶ Gravel Pack

*Penetration Resistance = The Number of Blows Required to Drive an 18 In. Split-Spoon Sampler 12 In. Into the Ground Using a Weight of 150 lbs. Falling Freely from a Height of 30 In.
B.D. - below detection.

APPENDIX F

GENERAL WELL CONSTRUCTION, SURVEYING, AND WATER LEVEL DATA

APPENDIX F

GENERAL WELL CONSTRUCTION, SURVEYING, AND WATER LEVEL DATA

TABLE F-1. WELL SPECIFICATIONS*

Monitoring Well No.	Date Drilled	Well Elevation (Ft) ASL	Well Depth (Ft)	Well Bottom Elevation	Screened Interval (Ft)	Screen Length (Ft)	Top Of Screen Elevation	Well Casing Ht. Above Ground Surface	Ground Surface Elevation	Gravel Pack Interval	Elevation Top Of Gravel Pack	Elevation Top Bentonite Seal
MW-40	23OCT86	93.74	14.76	78.98	9.96-14.76	4.8	83.78	1.97	91.77	8.01-14.26 0.5' CAVE	85.73	87.68
MW-41	24OCT86	91.52	14.02	77.50	9.22-14.02	4.8	82.30	2.21	89.31	7.12-14.02	84.40	85.40
MW-42	3NOV86	93.69	14.87	78.82	9.87-14.87	5.0	83.82	2.40	91.29	7.20-14.87	86.49	87.49
MW-43	22OCT86	104.02	23.96	80.06	13.96-23.96	10.0	90.06	1.25	102.77	11.15-23.96	92.87	94.37
MW-44	4NOV86	75.76	15.04	60.72	4.37-15.04	10.67	71.39	3.54	72.22	4.04-5.04 10.0' CAVE	71.72	Plastic Sheeting
MW-45	4NOV86	75.14	13.67	61.47	4.35-13.67	9.32	65.82	4.10	71.04	4.26-5.0 8.67' CAVE	70.88	Plastic Sheeting
MW-46	4NOV86	75.84	13.54	62.30	4.21-13.54	9.33	66.51	3.92	71.92	4.13-4.47 9.07' CAVE	71.71	Plastic Sheeting
MW-47	5NOV86	76.76	15.07	61.69	4.63-15.07	10.44	72.13	3.88	72.88	4.38-6.39 8.68' CAVE	72.38	Plastic Sheeting
MW-48	28OCT86 31OCT86	75.52	24.22	51.30	12.22-24.22	12.00	63.30	2.00	73.52	15.22' CAVE	64.52	67.52
MW-49	5NOV86	76.78	12.62	64.16	4.57-12.62	8.05	72.21	3.90	72.88	4.4-7.40 5.22' CAVE	69.38	Plastic Sheeting
MW-50	15OCT86	100.80	18.77	82.03	9.25-18.77	9.52	91.55	1.75	99.05	6.25-18.77	94.55	95.55
MW-51	T11NOV86	77.20	9.44	67.76	4.46-9.44	4.98	72.74	4.21	72.99	4.29-6.12 3.32' CAVE	77.12	Plastic Sheeting
MW-52	11NOV86	77.49	9.79	67.70	4.23-9.79	5.56	73.26	3.98	73.51	4.06-6.73 3.06' CAVE	73.43	Plastic Sheeting
MW-53	11NOV86	77.60	10.67	66.93	4.58-10.67	6.09	73.02	4.08	73.52	4.41-9.58 1.09' CAVE	73.19	Plastic Sheeting
MW-54	W12NOV86	88.51	19.54	68.97	10.42-19.54	9.12	78.09	2.42	86.09	8.42-19.54	80.09	81.09
11	21JAN84	91.62	29.57	62.05	24.7-29.7	5.00	66.92	1.90	89.72			
12	29FEB84	85.85	24.27	61.58	18.67-23.67	5.00	67.18	3.17	82.68			
13	28FEB84	86.00	25.17	60.83	20.3-25.28	4.98	65.70	1.58	84.42			
14	24FEB84	74.94	16.21	58.73	11.5-16.5	5.00	63.44	1.83	73.11			

* All Values Are Shown Using Top of Well Casing as Datum

TABLE F-2. SURVEYING DATA (GRID COORDINATES)

LIST

PT		N.	E.
1		582725.871	2307419.639
2		583247.259	2308088.883
3		584647.880	2309308.190
4		584877.775	2309246.802
5		585967.706	2307755.403
6		586443.521	2307201.858
7		585699.580	2306533.029
8		585133.009	2305993.898
9	MW-40	585113.246	2306057.708
10	MW-41	585172.766	[illegible]
11	MW-42	585212.004	2305689.150
12		585853.589	2306186.993
13		586283.086	2306114.330
14		586398.900	2305950.600
15	MW-47	586429.670	2306024.349
16	MW-49	586274.198	2305927.626
17	MW-48	586255.337	2305915.046
18	MW-46	586084.290	2305782.506
19	MW 44	586246.469	2305782.163
20	MW 45	586428.055	2305907.579
21	MW-43	585950.013	[illegible]
22		587235.067	2307889.163
23		587478.951	2307585.468
24		587723.492	2307203.134
25		587629.922	2307170.039
26		587496.917	2307234.609
27	SB-55	587556.018	2307215.904
28	MW-54 SB-56	587500.899	2307266.834
29	SB-57	587444.092	2307289.803
30		586840.138	2308334.065
31		587215.988	2308672.442
32	SB-58	587237.331	2308224.821
33	SB-60	587273.801	2308609.695
34	SB-59	587464.895	2308351.210
35		587787.603	2309199.269
36		588678.397	2308231.744
37	MW-50	588575.870	2308156.745
38		588965.804	2307922.453
39		589248.005	2307509.630
40		589108.955	2307392.125
41		588990.278	2307302.924
42	MW 51	588934.060	2307173.060
43	MW-52	589178.501	2307358.472
44		589306.719	2307507.865
45	MW-53	589385.357	2307531.749

TABLE F-3: SUMMARY OF GROUNDWATER LEVELS

Monitoring Well Number	Well Casing Elev.	GROUNDWATER LEVELS							
		10 NOV 86		22 DEC 86		21 JAN 87		3 FEB 87	
		Depth[1]	Elev.[2]	Depth	Elev.	Depth	Elev.	Depth	Elev.
MW-40	93.74	10.71	83.03	9.64	84.10	6.00	87.74	4.98	88.76
MW-41	91.52	10.55	80.97	9.67	81.85	6.78	84.74	6.55	84.97
MW-42	93.69	12.61	81.08	11.92	81.77	10.00	83.69	9.10	84.59
MW-43	104.02	19.75	84.27	19.45	84.57	18.22	85.80	16.60	87.42
MW-44	75.76	4.50	71.26	5.00	70.76	4.50	71.26	4.70	71.06
MW-45	75.14	4.75	70.39	4.50	70.64	4.18	70.96	4.33	70.81
MW-46	75.84	4.68	71.16	4.40	71.44	3.89	71.95	4.10	71.74
MW-47	76.76	5.60	71.16	5.25	71.51	4.45	72.31	4.90	71.86
MW-48	75.52	3.30	72.22	2.90	73.88	1.44	74.08	2.48	73.04
MW-49	76.78	4.40	72.38	5.00	70.52	4.05	72.73	4.45	72.33
MW-50	100.80	13.70	87.10	13.01	87.79	10.95	89.85	8.60	92.20
MW-51	77.20	---	---	4.40	72.80	under water	---	4.40	72.80
MW-52	77.49	---	---	4.18	73.31	under water	---	4.10	73.39
MW-53	77.60	---	---	4.20	73.40	3.60	74.00	4.05	73.55
MW-54	88.51	---	---	12.31	76.20	10.95	77.56	9.18	79.33
MW-11	91.62	---	---	12.95	78.67	16.40	75.22	10.00	81.62
MW-12	85.85	---	---	17.25	68.60	10.60	75.25	14.10	71.75
MW-13	86.00	---	---	19.60	66.40	19.05	66.95	19.18	66.82
MW-14	74.94	---	---	8.30	66.64	7.88	67.06	8.18	66.76

1 Depth Below Top of Well Casing

2 Elevation Relative to M.S.L. (ft)

APPENDIX G

RESULTS OF WELL DEVELOPMENT, WELL PURGING, AND GROUNDWATER STABILIZATION DATA

APPENDIX G

RESULTS OF WELL DEVELOPMENT, WELL PURGING, AND GROUNDWATER STABILIZATION DATA

TABLE G-1

SUMMARY OF FINAL WELL DEVELOPMENT DATA

TABLE G-1. SUMMARY OF FINAL WELL DEVELOPMENT DATA

WELL NO.	DATE DEVELOPED	Σ TIME DEVELOPED (hours) [a]	WELL VOLUMES (gallons) [b]	TOTAL GALLONS REMOVED	NO. WELL VOLUMES REMOVED (GAL)	AVERAGE DISCHARGE RATE (GAL/MIN) [c]	ΣFINES REMOVED (pounds) [d]	SPECIFIC CONDUCTIVITY (μ MHOS) [e]	T°C [e]	pH [f]
MW 40	20 NOV 86	1.68	0.76	321	425	8.20	2.65	50	20	4.30
MW 41	21 NOV 86	1.30	0.62	40	65	0.73	0.33	70	21	5.20
MW 42	20 NOV 86	0.85	0.42	33	78	0.77	0.25	70	21	4.60
MW 43	23 OCT 86	2.50	0.68	83	92	Bailed	0.62	40	20	5.00
MW 44	19 NOV 86	1.10	1.72	214	124	4.40	2.10	80	18	4.30
MW 45	19 NOV 86	1.17	1.59	128	20	6.70	0.75	75	18	5.15
MW 46	18 NOV 86	0.83	1.52	568	374	12.73	2.76	140	18	5.60
MW 47	20 NOV 86	0.77	1.61	278	172	12.52	1.87	70	18	4.80
MW 48	19 NOV 86	1.92	3.38	106	31	2.30	8.00	50	17	5.30
MW 49	19 NOV 86	2.07	1.34	78	14	0.86	0.50	70	18	5.05
MW 50	21 NOV 86	2.23	0.39	179	460	1.67	2.10	80	20	4.65
MW 51	24 NOV 86	1.00	0.76	42	55	1.39	0.67	480	16	6.35
MW 52	24 NOV 86	1.77	1.05	35	33	0.59	0.84	455	16	6.15
MW 53	24 NOV 86	1.22	1.01	86	85	3.75	0.25	400	16	6.15
MW 54	25 NOV 86	1.25	1.09	61	56	2.13	2.30	60	18	4.60
MW 11	25 NOV 86	1.20	2.57	40	16	0.46	0.67	50	19	5.85
MW 12	01 DEC 86	0.88	1.03	177	172	3.32	1.40	100	19	5.60
MW 13	24 NOV 86	Bailed	0.88	16	18	Bailed	0.25	125	18	6.15
MW 14	01 DEC 86	1.75	1.45	42	29	0.15	0.25	50	27	5.60

a) Cummulative Time Developed: Composite time of surging and pumping.

b) Well Volume: Constant used to calculate well volume 0.165 gallons per foot multiplied by the height of the water column in feet.

c) Discharge rates: Measured from the discharge of a 15 gallon per minute gasoline powered centrifugal pump.

d) Cummulative Fines Removed: Wet weight (pounds), as measured with a triple beam balance, of fine sediments that settled in the bottom of the separator.

e) Specific Conductance and Temperature: Measured with a Y.S.I S-C-T 33 meter. (Conductivity accuracy: ± 3.0% max. error at 250, 2,500, and 25,000 plus probe)(Temperature accuracy: ± 0.6°C at 45°C) Valves shown in table were recorded at the end of development procedures for individual wells.

f) pH Measured with a Fisher 107 meter with gel-filled probe (MW-43 measured with pH paper) (meter accuracy: ± 0.05 pH per pH unit) Values shown in table were recorded at the end of development procedures for individual wells.

TABLE G-2

FINAL WELL DEVELOPMENT RECORDS

WELL DEVELOPMENT PROCEDURE

PROJECT TITLE: SJAFB

WELL NUMBER (AREA): MW-11 Fire Training Area

DATE: 25 NOV 86 27.57

WATER LEVEL: 13.65' TOTAL DEPTH: ________ WELL VOLUME: 2.57

PROCEDURES: centrifugal pump
SAND CONTENT MEASURED IN 500ml graduated cylinder

CLOCK TIME: 12:43

PUMP START	DISCHARGE START	DISCHARGE STOP	DISCHARGE YIELD	WATER COLOR	SED. CONTENT	pH	PARAMETERS INTERVAL(FT.)	ToC	umhos	PUMP STOP	PUMP PERIOD	Q FOR PERIOD
				DK GRAY			surface	21°	60			
				LT GRAY			18'	21°	60			
15:00				CLEAR			off bottom	19°	75			
	22:07				20%		Discharge	21	50			
	25:00					5.80						
	36:26	40:51	0.45		30%		DISCHARGE	21	50		0:04:25	0.45 gal/min
43:34						5.85	DISCHARGE	21	50			
	52:37	56:42	0.49		10%						0:04:05	0.49 gal/min
59:12					10%	5.85	DISCHARGE	21	50			
1:20:40	22:00	26:39	0.44		8%						0:04:34	0.44 gal/min
~~1:24~~					<5%	5.85	DISCHARGE	21	50	1:27:31		
											1.20 hr	Q=40.26 gal
							BELOW SURFACE	19	50			
							18'	19	50			
							OFF BOTTOM	19	50			
												$\bar{x}$=0.46 gal/min

no sheen or film present on surface of discharge water in separator

CLOCK TIME: 2:53 COUNT DEVELOPMENT TIME: 1 HRS. 12 MIN.

TOTAL DISCHARGE: 40.26 GALLONS #15.67 WELL VOLUMES

APPROXIMATED TOTAL FINES REMOVED: 0.67 lbs PERSONNEL: CW

WELL DEVELOPMENT PROCEDURE

PROJECT TITLE: CJAFB Phase II STAGE 2

WELL NUMBER (AREA): MW 12 (LANDFILL 1)

DATE: 1 DEC 86

WATER LEVEL: 18.05 TOTAL DEPTH: 24.27 WELL VOLUME: 1.03 GAL

PROCEDURES: STEP PUMPING W/ OVERPUMPING

CLOCK TIME: 1:12

PUMP START H/M/S	DISCHARGE START	DISCHARGE STOP	DISCHARGE YIELD GAL/MIN	WATER COLOR	SED. CONTENT	pH	PARAMETERS INTERVAL(FT.)	ToC	umhos	PUMP STOP H/M/S	PUMP PERIOD MIN	Q FOR PERIOD
							BELOW SURFACE	18°	80			
							OFF BOTTOM	18°	120			
0:03:36	:06:29	:07:29	2.41	RUST	[illegible]	5.65						
0:07:29				CLEAR	"			18°	100			
0:11:24				"	LIMITED SD	5.65		19°	100			
0:17:00	:18:09	:19:02	3.33					19	100			
	:30:38	:31:24	2.61		NO SD.	5.55		19	100			
	:44:50	:45:21	3.87			5.60		19	100			
	:50:18	:50:50	3.75			5.60		19	100			
	:57:28	:57:29	4.00			5.60		19	100	0:57:59	53.33	
			$\bar{Q}$ = 3.32									

CLOCK TIME: 2:12 COUNT DEVELOPMENT TIME: ____ HRS. 53 MIN.

TOTAL DISCHARGE: 177 GALLONS # 172 WELL VOLUMES

APPROXIMATED TOTAL FINES REMOVED: 1.4 pounds PERSONNEL: SC CV

WELL DEVELOPMENT PROCEDURE

PROJECT TITLE: SLAFB

WELL NUMBER (AREA): MW-13 LANDFILL #4

DATE: 24 Nov 86

0.88 gl

WATER LEVEL: 19.55ft TOTAL DEPTH: 25.17 WELL VOLUME: ————

PROCEDURES: • BAILER (0.700 l volume)
11 BAILS/2 gal.

CLOCK TIME: 4:00

PUMP	DISCHARGE			WATER	SED.		PARAMETERS			PUMP	PUMP	Q FOR
START	START	STOP	YIELD	COLOR	CONTENT	pH	INTERVAL(FT.)	ToC	umhos	STOP	PERIOD	PERIOD
						6.25	below Surface	19°	1400			
							off Bottom	18°	1600			
			2	[illegible]	very [illegible]							
			2	"	"							
			2	"	"	6.15	Below surface	18°	450			
			2	"	"		off Bottom	18°	125			
			2	"	"							
			2	"	"							
			2	"	"	6.15	Below surface	18°	1100			
			2	"	"		off Bottom	18°	125			

FILM or SHEEN ON SURFACE OF DISCHARGE WATER

CLOCK TIME: 5:00 COUNT DEVELOPMENT TIME: 1 HRS. 00 MIN.

TOTAL DISCHARGE: 16 GALLONS # 18.2 WELL VOLUMES

APPROXIMATED TOTAL FINES REMOVED: 0.25 lbs PERSONNEL: SG

736 5556

WELL DEVELOPMENT PROCEDURE

PROJECT TITLE: SJAFB Phase III Stage II

WELL NUMBER (AREA): MW-14 (Landfill #4)

DATE: 1 Dec 86

WATER LEVEL: 7.4ft BGT. TOTAL DEPTH: 16.21 BGT. WELL VOLUME: 1.45

PROCEDURES: Step pump w/ overpumping

CLOCK TIME: 4:30

PUMP START	DISCHARGE START	DISCHARGE STOP	DISCHARGE YIELD	WATER COLOR	SED. CONTENT	pH	PARAMETERS INTERVAL(FT.)	ToC	umhos	PUMP STOP	PUMP PERIOD	Q FOR PERIOD
1450				v	[illegible]	5.2	Surface	18	100	Rust Colored		
	0:12:40		0.16				Bottom	19	110	Clear at 25:00		
	1959	32:39	2 gal	Clear	25:00	5.55	NO Sed.	27	50		0:12:40	0.16 gal/min
	0:12:40		0.16									
	37:51	50:31	2 gal	Clear	None	5.55		27	50		0:12:40	0.16 gal/min
	0:13:04		0.15								0:50:18	
	54:17	1:07:21	2 gal	Clear	None	5.60		27	50	1:10:15	~~0:13:04~~	0.15
												Σ=7.88 gal

PUMP ABANDONED FOR HAND BAILER — INSUFFICIENT YIELD

Σ=0.16 gal/min

8 Bail's empty Well Bore Removed 5 gal

CLOCK TIME: 6:30 COUNT DEVELOPMENT TIME: 1 HRS. 45 MIN.

TOTAL DISCHARGE: 47 GALLONS # 29 WELL VOLUMES

APPROXIMATED TOTAL FINES REMOVED: 0.25 lbs PERSONNEL: SG, CW

WELL DEVELOPMENT PROCEDURE

PROJECT TITLE: SJAFB (Fire training Area)

WELL NUMBER (AREA): MW 40

DATE: 20 NOV 86

WATER LEVEL: 10.18'   TOTAL DEPTH: 14.76   WELL VOLUME: 0.756

PROCEDURES: Surge and pump until sediment content in discharge is negligable

CLOCK TIME: 2:05

PUMP START	DISCHARGE START	DISCHARGE STOP	DISCHARGE YIELD	WATER COLOR	SED. CONTENT	pH	PARAMETERS INTERVAL (FT.)	ToC	umhos	PUMP STOP H.M.S.	PUMP PERIOD min.	Q FOR PERIOD
0:11:41	:15:26	:15:49	5.22	DEEP RUT BRN	SILT FIN SD	4.20	surface	20°	70	17:52	8.25	42.80
							12'	20°	75			
							bottom	20.5°	75			
SURGE												
0:27:29				"	"					0:35:00	7.50	39.15
SURGE												
0:44:29	:46:28	:46:41	9.23	"	SD NEG					0:50:39	6.10	56.30
SURGE												
0:56:09	57:21	59:49	9.12	"	"	4.30				1:01:30	5.40	49.24
CLOCK RESET												
1:11:27										1:18:49	7.36	67.12
1:35:22	(18:03	18:16)	9.23			4.50				1:38:32	3.12	28.79
SURGE												
1:53:01				"	"	4.30		20	50	1:57:15	4.12	58.03

CLOCK TIME: 4:01   COUNT DEVELOPMENT TIME: 1 HRS. 41 MIN.

TOTAL DISCHARGE: 321.43 GALLONS # 425 WELL VOLUMES

APPROXIMATED TOTAL FINES REMOVED: 2.65 lbs   PERSONNEL: CW SG

WELL DEVELOPMENT PROCEDURE

PROJECT TITLE: SJAFB

WELL NUMBER (AREA): MW 41 (Fire training Area)

DATE: 21 NOV 86

WATER LEVEL: 10.25' TOTAL DEPTH: 14.02 WELL VOLUME: 0.622

PROCEDURES: SURGE AND PUMP WELL UNTIL SEDIMENT CONTENT IN DISCHARGE WATER IS NEGLIGABLE.

CLOCK TIME: 10:20

PUMP START	DISCHARGE START	DISCHARGE STOP	DISCHARGE YIELD	WATER COLOR	SED. CONTENT	pH	PARAMETERS INTERVAL (FT.)	ToC	umhos	PUMP STOP HMS	PUMP PERIOD MIN	Q FOR PERIOD GAL
0:03:29	:26:37	:29:40	0.66	GRY-BRN	SILT VFN	5.45				:30 37	27.0	17.8
SURGE												
0:37:30				"	"					:40:52	3.37	2.22
SURGE												
0:42:04	:48:03	:51:03	0.67	"	NEG					:51:26	9.33	6.25
SURGE												
0:57:08				>9%T	NEG	5.40				1:04:12	7.0	4.69
SURGE												
1:09:42										1:15:24	5.67	3.79
SURGE												
1:21:31	:23:28	:25:31	0.98	"	"	5.20	below surface	21	80	1:27:14	5.72	5.61
							bottom	21	70			

CLOCK TIME: 11:50 COUNT DEVELOPMENT TIME: 1 HRS. 18 MIN.

TOTAL DISCHARGE: 40.36 GALLONS # 64.9 WELL VOLUMES

APPROXIMATED TOTAL FINES REMOVED: 0.316 PERSONNEL: SG Caud

WELL DEVELOPMENT PROCEDURE

PROJECT TITLE: SJAFB (2676-16)

WELL NUMBER (AREA): MW42 (FIRE TRAINING AREA)

DATE: 20 NOV 86

WATER LEVEL: 12.31'   TOTAL DEPTH: 14.87   WELL VOLUME: 0.422 gal

PROCEDURES: • Surge and pump until fine sediment is negligable in discharge water

CLOCK TIME: 8:00

PUMP START	DISCHARGE START	DISCHARGE STOP	DISCHARGE YIELD	WATER COLOR	SED. CONTENT	pH	PARAMETERS INTERVAL(FT.)	ToC	umhos	PUMP STOP NMS	PUMP PERIOD MIN	Q FOR PERIOD GAL
							SURFACE	21	80			
							BOTTOM	21	70			
8:15:30	:24:47	:32:18	0.80	TAN-MED BRN	FN SD 2-4%	4.80				:32:50	17.33	15.86 gal
SURGE												
:42:00				"	"					:49:31	7.50	6.00
SURGE												
:53:00			CLOCK	STOP	— PUMP	STOP						
00:00	:04:47	:07:36	0.71	"	"					:08:25	8.52	6.05
SURGE												
0:13:21	:18:01	:20:40	0.76	>%T	<FN SD	4.60		21	70	:22:45	9.40	7.14

CLOCK TIME: 9:15   COUNT DEVELOPMENT TIME: 0 HRS. 51 MIN.

TOTAL DISCHARGE: 33.05 GALLONS   # 78.32 WELL VOLUMES

APPROXIMATED TOTAL FINES REMOVED: 0.25 lbs   PERSONNEL: SG

WELL DEVELOPMENT PROCEDURE

PROJECT TITLE: JUAFB

WELL NUMBER (AREA): MW-43 (LANDFILL 4)

DATE: 23 OCT 86

WATER LEVEL: 18.51 BGS TOTAL DEPTH: 22.65 BGS WELL VOLUME: 0.68 gal

PROCEDURES: PVC Bailer; bail until parameters stabilize (pH, umhos, T)

CLOCK TIME: 10:15

PUMP START	DISCHARGE START	DISCHARGE STOP	DISCHARGE YIELD	WATER COLOR	SED. CONTENT	pH (Paper)	PARAMETERS INTERVAL(FT.)	ToC	umhos	PUMP STOP	PUMP PERIOD	Q FOR PERIOD
	10:15			brown	fn sd	5.0		19°C	40			
	10:47			brown	fn sd	5.0		20.5°C	40			
												55 Gal
	2:25			brown	fn sd	5.0		20°C	40			
	5:35			milky brn		5.0		20.5°C	40			83 Gal

CLOCK TIME: ______ COUNT DEVELOPMENT TIME: 3 HRS. 30 MIN.

TOTAL DISCHARGE: 138 GALLONS # 202 WELL VOLUMES

APPROXIMATED TOTAL FINES REMOVED: ______ PERSONNEL: Jim, Stc

WELL DEVELOPMENT PROCEDURE

PROJECT TITLE: SJAFB (7176-16)

WELL NUMBER (AREA): MW 44 (LANDFILL 4)

DATE: 19 NOV 86

WATER LEVEL: 4.60 TOTAL DEPTH: 15.04 WELL VOLUME: 1.72

PROCEDURES: Pump and surge well until the amount of sediment in the discharge is negligable

CLOCK TIME: 3:00

PUMP START HMS	DISCHARGE START MS	DISCHARGE STOP MS	DISCHARGE YIELD GAL/MIN	WATER COLOR	SED. CONTENT	pH	PARAMETERS INTERVAL(FT.)	ToC	umhos	PUMP STOP MS	PUMP PERIOD MIN	Q FOR PERIOD GAL
							SURFACE	17	120			
							BOTTOM	18	110			
0:02:27	:09:55	:10:14	4.62		no sand, set gravel					:10:23	8.0	36.96
SURGE												
0:15:12					V.FN. SD [illegible]	4.45				:21:48	6.54	30.21
SURGE												
PUMP FAILURE (GRAVEL)												
0:00:10						4.40				:03:34	3.38	15.62
SURGE												
0:07:06	:09:27	:09:51	5.00							:10:18	3.20	16.00
SURGE												
0:13:05					< FN	4.30				:18:04	5.00	25.00
SURGE												
0:22:00										:25:01	3.01	15.0
SURGE												
0:29:00										:36:10	7.16	35.80
SURGE							SURFACE	18	80			
0:39:10	:41:50	:42:20	4.00		<< FN	4.30	BOTTOM	18	85	:47:00	7.83	39.15

CLOCK TIME: 4:45 COUNT DEVELOPMENT TIME: 1 HRS. 06 MIN.

TOTAL DISCHARGE: 214 GALLONS #124 WELL VOLUMES

APPROXIMATED TOTAL FINES REMOVED: ~2.1 lbs PERSONNEL: SC [illegible]

WELL DEVELOPMENT PROCEDURE

PROJECT TITLE: SVAFB

WELL NUMBER (AREA): MW-45 (Landfill #4)

DATE: 19 Nov 86

WATER LEVEL: 4.58 ft TOTAL DEPTH: 13.67 WELL VOLUME: 1.59

PROCEDURE: ALTERNATION OF SURGING AND

CLOCK TIME: 4.20

PUMP START	DISCHARGE START	DISCHARGE STOP	DISCHARGE YIELD	WATER COLOR	SED. CONTENT	pH	PARAMETERS INTERVAL(FT.)	PARAMETERS ToC	PARAMETERS umhos	PUMP STOP	PUMP PERIOD	Q FOR PERIOD
HR MIN SEC	MIN/SEC		GAL/MIN								MIN SEC	
0:10:20							surface	16°	70			
							~7'	17°	75			
							~14'	18°	70			
0:14:15				PUMP			FAILURE					
0:33:19	35:29	35:41	10.0 ✓	DK BRN	SILT V.FN SD	5.0				37:12	3 53	~55.53
SURGE	12sec											
0:42:32				DK BRN	"					45:24	2 52	~17.94
SURGE												
0:49:59	49:53	50:12	6.32 ✓	DK BRN	SILT V.FN SD					52:42	3 43	~24.8
SURGE	19sec											
0:57:41	58:01	58:19	6.67 ✓	"	SILT MED SAND					1:02:07	4 26	~20.35
SURGE	18sec											
1:01:27	08:19	08:41	5.46 ✓	MILK BROWN	SILT MED SAND	5.15				1:09:34	3 07	~17.00
1:17:54	22sec						surface	17°	75			
							~7'	18°	75			
							~14'	18°	70			

128.13

CLOCK TIME: 5:25 COUNT DEVELOPMENT TIME: 1 HRS. 10 MIN.

TOTAL DISCHARGE: 129 GALLONS # 19.90 WELL VOLUMES

APPROXIMATED TOTAL FINES REMOVED: 3/4 lbs PERSONNEL: SC

WELL DEVELOPMENT PROCEDURE

PROJECT TITLE: SJAFE (2676-16)

WELL NUMBER (AREA): MW 46 (Landfill 4)

DATE: 18 NOV 86

WATER LEVEL: 4.30'   TOTAL DEPTH: 13.54   WELL VOLUME: 1.52

PROCEDURES: Surge block alternating w/ overpumping repeated until fine content is negligible. All equipment cleaned w/ Alconox soap + tap

CLOCK TIME: 8:15

PUMP START (HMS)	DISCHARGE START (HMS)	DISCHARGE STOP (HMS)	YIELD (GAL/MIN)	WATER COLOR	SED. CONTENT	pH	PARAMETERS INTERVAL (FT.)	ToC	umhos	PUMP STOP (HMS)	PUMP PERIOD (MIN)	Q FOR PERIOD (GAL)
							SURFACE		190			
							BOTTOM		200			
0:19:20				BRN	3PPT					0:30:12	10.37	113.14
SURGE	RESTART (PUMP FAILURE)											
0:00:48	:03:42	:03:53	10.91							0:06:24	5.51	60.11
SURGE												
0:11:46						5.65				0:20:05	8.32	90.77
SURGE												
0:21:00	:28:26	:28:28	10.00							0:29:02	5.0	50.00
SURGE												
0:33:14						5.60				0:36:52	3.56	35.60
SURGE												
0:43:13	:46:01	:46:09	15.00							0:46:31	3.30	49.50
SURGE												
0:50:31	0:53:58	54:06	15.00							0:54:32	4.0	60.15
SURGE	:											
0:57:49	:									1:01:48	3.00	45.0
SURGE						5.60	SURFACE	19	160			
1:05:26							BOTTOM	18	140	1:09:13	4.28	64.20

CLOCK TIME: 9:25   COUNT DEVELOPMENT TIME: ____ HRS. 50 MIN.

TOTAL DISCHARGE: 568 GALLONS   # 374 WELL VOLUMES

APPROXIMATED TOTAL FINES REMOVED: 2.76 lbs   PERSONNEL: SG, CW

WELL DEVELOPMENT PROCEDURE

PROJECT TITLE: TJAFB (2676-16)

WELL NUMBER (AREA): MW 47 (LANDFILL 4)

DATE: 20 Nov 86

WATER LEVEL: 5.30 TOTAL DEPTH: 15.07 WELL VOLUME: 1.61

PROCEDURES: Surge block alternating with overpumping repeated until fine content of discharge is negligable. All equipment cleaned w/ Alconox + tap

CLOCK TIME: 1:50

PUMP START	DISCHARGE START	DISCHARGE STOP	DISCHARGE YIELD	WATER COLOR	SED. CONTENT	pH	PARAMETERS INTERVAL(FT.)	ToC	umhos	PUMP STOP	PUMP PERIOD	Q FOR PERIOD
							SURFACE	14	230			
							8'	15	230			
							15'	17	250			
SURGE												
0:11:20	:15:30	:15:45	9.23	BRN	V FN SL CNT					:16:10	4.85	44.58
SURGE												
0:21:24	:23:50	:23:59	13.37	"	"	4.85		17	100	:25:40	4.27	56.92
SURGE												
0:34:01				"	"	4.85		17	100	:38:05	4.0	53.37
SURGE												
0:43:17	:44:50	:44:59	15.00	MLKY BRN	NEG	4.80		17	105	:46:51	3.54	53.10
SURGE												
0:52:51				"	NEG	4.80	SURFACE	17	110	:57:53	4.65	69.75
							8'	17.5	100			
							15'	18	70			

CLOCK TIME: 2:00 COUNT DEVELOPMENT TIME: 0 HRS. 46 MIN.

TOTAL DISCHARGE: 278 GALLONS # 172 WELL VOLUMES

APPROXIMATED TOTAL FINES REMOVED: 1.87 lbs PERSONNEL: SG CW

WELL DEVELOPMENT PROCEDURE

PROJECT TITLE: [illegible] (2676-16)

WELL NUMBER (AREA): MW-4B (Landfill #4)

DATE: 19 Nov 86

WATER LEVEL: 4.05ft (BELOW PVC CASING TOP) TOTAL DEPTH: 24.22 WELL VOLUME: ~~4.66~~ 3.38 gallons

Procedure: ALTERNATION OF SURGING WITH OVERPUMPING UNTIL CLEAR - REPEAT UNTIL FINES ARE ABSENT

CLOCK TIME: 1:40

PUMP START	DISCHARGE START	DISCHARGE STOP	DISCHARGE YIELD	WATER COLOR	SED. CONTENT	pH	PARAMETERS INTERVAL (FT.)	PARAMETERS ToC	PARAMETERS umhos	PUMP STOP CLEAR	PUMP PERIOD MIN:SEC	Q FOR PERIOD
0:5:26							surface	16°	50			
							~12'	18°	50			
							~24.5'	18°	50			
0:9:00				DK BRN	[illegible]					0:11:[illegible]	2:14	~5:56
SURGE												
0:25:23	30:13	29:57	2.79	DK BRN	"					30:47	5:24	~14.80
SURGE	0:00:44											
0:37:14				"	<FN SD	5.40				43:44	6:30	~17.51
SURGE	0:0:10											
0:52:25	54:51	56:00	1.71	LIGHT BRN	"					1:02:55	9:06	~12.77
	58:55	59:45	~~1.71~~ 2.40									
SURGE	0.00:50											
1:09:21				"	"	5.30				1:20:04	9:06	~12.77
SURGE												
1:26:29	28:06	28:50	2.55	"	[illegible]					1:38:11	12:00	~21.2
SURGE	0:00:47											
1:40:50	47:07	48:37	2.35	"	NEG [illegible]	5.30				1:49:52	8:07	~21.08
1:54:20	0:00:51						surface	17°	55			
							~12'	17°	60			
							~24.5'	17.5°	50			

106 gallons

CLOCK TIME: 3 35 COUNT DEVELOPMENT TIME: 1 HRS. 55 MIN.

TOTAL DISCHARGE: 106 GALLONS # 7.76 WELL VOLUMES

APPROXIMATED TOTAL FINES REMOVED: ~8.0 lbs PERSONNEL: [illegible]

WELL DEVELOPMENT PROCEDURE

PROJECT TITLE: SWAFR 49

WELL NUMBER (AREA): MW 49 (Con Well #4)

DATE: 19 Nov 86

WATER LEVEL: 5.25 ft TOTAL DEPTH: 12.62 WELL VOLUME: 1.34
(BELOW PVC CASING TOP)

PROCEDURE: ALTERNATION OF SURGING AND OVERPUMPING UNTIL CLEAR → REPEAT UNTIL FINES ARE ABSENT EQUIPMENT: SURGE BLOCK, CENTRIFUGAL PUMP, SEPARATOR BASIN.

CLOCK TIME: 9:02

PUMP START (HRS:MIN:SEC)	DISCHARGE START	DISCHARGE STOP	DISCHARGE YIELD (2 GAL VOL)	WATER COLOR	SED. CONTENT	pH	PARAMETERS INTERVAL (FT.)	ToC	umhos	PUMP STOP (WATER CLEAR)	PUMP PERIOD (MIN)	Q FOR PERIOD
							surface	16°	115			
							~9'	15°	65			
							~13'	18°	66			
00:00	6:07	8:26	~1 gal/min	dk milky brown	v. fn sd silt	5.05				18:54	12.47	~12.78
SURGE	2:18		0.86									
0:27:18				"	"					38:33	11.15	~11.25
SURGE												
0:41:21	51.05	53:14	~.93	milky brn	v. fn brn sd silt	5.04				51:30	10.09	~9.38
SURGE	2:09											
1:07:52				"	< v. fn sd silt					1:20:22	12.5	~12.20
SURGE												
1:25:20	1:30:20	1:32:47	~.82	light milky	NFS SD					1:34:43	9.22	~7.57
SURGE	2:27											
1:41:06				"	"	5.05				1:53:43	12.62	~11.25
2:4 21							surface	18°	75			
							~8'	18°	80			
							~12'	18°	70			
			Σ=0.87									
			$\bar{x}$=.87									77.57

$\bar{Q}$ = 108.33 gal Total

CLOCK TIME: 11:00 COUNT DEVELOPMENT TIME: 2 HRS. 04 MIN.

TOTAL DISCHARGE: 77.57 GALLONS # 14.4 WELL VOLUMES

APPROXIMATED TOTAL FINES REMOVED: 0.5 lbs settled in separator PERSONNEL: SG

WELL DEVELOPMENT PROCEDURE

PROJECT TITLE: SJAFB

WELL NUMBER (AREA): MW 50 (Landfill 3)

DATE: 21 Nov 86

WATER LEVEL: 16.41'   TOTAL DEPTH: 18.77   WELL VOLUME: 0.389

PROCEDURES: • Surge block alternating with overpumping repeated until fine content of discharge water is negligible. All equipment cleaned with alconox + tap rinse. DISCHARGE INTO A SEPARATE

CLOCK TIME: 1:30

PUMP START	DISCHARGE START	DISCHARGE STOP	DISCHARGE YIELD	WATER COLOR	SED. CONTENT	pH	PARAMETERS INTERVAL(FT.)	ToC	umhos	PUMP STOP	PUMP PERIOD	Q FOR PERIOD
1:40							below surface	19	80			
							off bottom	19.5	95			
0:05:03	:23:30	:25:01	1.32	MILKY BROWN	FINE SAND + SILT	4.70		19	.80	0:25:14	20.20	26.7
0:31:56	1.31			"	"	"		19	85	0:59:06	7.16	9.45
SURGE												
0:51:02	:51:49	:52:43	2.22	"	"	4.70		19	80	1:31:00	40.0	88.80
SURGE	0.54											
1:12:46	:13:46	CLOCK		STOPED	RESET	(3:56)						
	0:47											
0:8:56				"	NFG SLT	4.60				0:18:30	9.51	13.79
SURGE												
0:22:44	:23:59	:25:02	1.45	"	FN SD					0:29:50	7.10	10.29
SURGE	1.23											
0:35:44	:37:24	:38:40	1.58	"	FN SD					0:39:57	4.21	6.15
SURGE	1.16											
0:44:26	:45:23	:46:38	1.33	"	NFC		below surface	19°	80	0:49:02	4.60	6.12
1:01:32	1:02:03	:02:59	2.14	"	NFC	4.65	off bottom	20°	90	1:05:35	8.00	17.12
	.56											

CLOCK TIME: 3:48   COUNT DEVELOPMENT TIME: 2 HRS. 14 MIN.

TOTAL DISCHARGE: 179 GALLONS   # 460 WELL VOLUMES

APPROXIMATED TOTAL FINES REMOVED: 2.10 lbs   PERSONNEL: SG

WELL DEVELOPMENT PROCEDURE

PROJECT TITLE: 5 J AFB

WELL NUMBER (AREA): MW-51 (Landfill #3)

DATE: 24 Nov 86

WATER LEVEL: 4.90 ft TOTAL DEPTH: 9.44 WELL VOLUME: 0.76

PROCEDURES: • Alternation surge block w/ over pumping (centripital pump) → Repeat until fines are negligably absent

CLOCK TIME: 3:55

PUMP START	DISCHARGE START	DISCHARGE STOP	DISCHARGE YIELD (GAL/MIN)	WATER COLOR	SED. CONTENT	pH	PARAMETERS INTERVAL (FT.)	PARAMETERS ToC	PARAMETERS umhos	PUMP STOP	PUMP PERIOD	Q FOR PERIOD
							below surface	16°	430			
SURGE			1.45				off Bottom	16°	600			
0:10:42	14:39	16:02	[illegible]	BRN	SILT W/ [illegible]					16:23	5:41 5.69	8.74
SURGE	1.23											
0:20:34	23:31	25:04	1.27	BRN	SILT SUSPENDED	6.35				0:26:38	5.54 5.9	7.61
SURGE	1.3											
0:33:31	38:13	39:42	1.39 .14	"	SILT [illegible]					0:40:44	7.47 7.1	10.40
SURGE	1.29						After Pump					
0:43:39	47:47	48:33	1.39 .75		SILT [illegible] SD	6.35	Surface	16	480	0:49:01	5.31 5.51	7.66
SURGE	1.26						Bottom	16	495			
0:54:2?	56:08	57:29	1.48 .075							1:00:00	5.37 5.61	8.30
	1.21											

CLOCK TIME: 4:58 COUNT DEVELOPMENT TIME: 1 HRS. 00 MIN.

TOTAL DISCHARGE: 42.21 GALLONS # 55.5 WELL VOLUMES

APPROXIMATED TOTAL FINES REMOVED: 0.67 lbs PERSONNEL: SG

WELL DEVELOPMENT PROCEDURE

PROJECT TITLE: S.A.F.B.

WELL NUMBER (AREA): MW-52 (Landfill #3)

DATE: 24 Nov 86

WATER LEVEL: 4.75 TOTAL DEPTH: 9.79 WELL VOLUME: 1.05

PROCEDURES: ALTERNATING SURGING W/ OVERPUMPING → REPEAT UNTIL FINES ARE (CENTRIFUGAL PUMP) NEGLIGIBLY ABSENT. ALL Equipment washed and rinsed w/ Alconox + H_2O water

CLOCK TIME: 1:38

PUMP START (hr/min/sec)	DISCHARGE START (min/sec)	DISCHARGE STOP (min/sec)	DISCHARGE YIELD (GAL/MIN)	WATER COLOR	SED. CONTENT	pH	PARAMETERS INTERVAL (FT.)	ToC	umhos	PUMP STOP (WATER CLEAR)	PUMP PERIOD (MIN)	Q FOR PERIOD (GAL/MIN)
							BELOW SURFACE	16°	492			
	2.13		.90				OFF BOTTOM	17°	1050			
SURGE	0:04:55		[illegible]									
.90 0:6:35	8:57	11:10	[illegible]	[illegible]	SILTY [illegible] SD					12:07	5:13 5.53	4.70
SURGE	0:05:39		[illegible]									
.36 0:14:40	19:46	23:25	0.35	DK BRN	SILTY [illegible] SD	6.52				27:46	13:06 13.1	4.59
SURGE	0:06:41		[illegible]									
.30 0:32:10	46:12	46:53	0.30	DK BRN	SILTY [illegible] SD	6.50				[illegible]	15.04 15.06	4.56
SURGE	0:04:39		[illegible]									
0:51:38	53:24	58:03	0.43	BRN	SILTY [illegible]					1:07:51	11:13 11.21	4.82
SURGE												
1:02:08	[illegible]		[illegible]	PUMP			FAILURE					
1:15:17	1:18:02	1:19:39	1.24	DK BRN	SILTY [illegible] SD	6.15				1:21:59	6:0 6.0	7.44
SURGE	0:03:46											
1:24:42	1:25:31	1:29:07	.53	BRN	[illegible] SD					1:34:22	9:39 9.65	5.11
SURGE	0:04:54		4.9									
1:36:35	1:38:51	1:43:45	0.41	"	SILTY [illegible] SD		BELOW SURFACE	16°	455	1:46:18	9:43 9.72	3.98
							OFF BOTTOM	16°	455			
												[illegible]

CLOCK TIME: 3:28 COUNT DEVELOPMENT TIME: 1 HRS. 46 MIN.

TOTAL DISCHARGE: 35.6 GALLONS # 33 WELL VOLUMES

APPROXIMATED TOTAL FINES REMOVED: 0.24 lbs PERSONNEL: SG, EW

WELL DEVELOPMENT PROCEDURE

PROJECT TITLE: SIAFS

WELL NUMBER (AREA): MW N 53 (Landfill #3)

DATE: 24 Nov 86

WATER LEVEL: 4.42' TOTAL DEPTH: [illegible] WELL VOLUME: 1.01

PROCEDURES: • ALTERNATION OF SURGING + OVERPUMPING → REPEAT UNTIL FINES ARE ABSENT. Equipment cleaned between each well – triple cleaned between sites

CLOCK TIME: 11:50

PUMP START	DISCHARGE START	DISCHARGE STOP	DISCHARGE YIELD	WATER COLOR	SED. CONTENT	pH	PARAMETERS INTERVAL(FT.)	ToC	umhos	PUMP STOP	PUMP PERIOD	Q FOR PERIOD
							below Surface	16°	280			
							~8'	17°	340			
4.76 SURGE 0:13:53	16:19	16:44	4.80	DK BRN	SILT, [illegible]					17:04	3:11	4.8 gpm (15.26 [illegible]
surge 0:20:23	21:45	22:14	4.14	DK BRN	SILT [illegible]	6.15				23:31	3:07	4.14 (12.42 GAL)
surge 0:29:32				DK BRN	[illegible]		below surface	16°	390	31:35	3:03	
							off Bottom	17°	400			
4.00 SURGE 0:37	38:16	38:46	4.00	DK BRN	SILT [illegible]					41:13	3:40	4.00 (13.88 [illegible]
SURGE 0:46:11	47:02	47:34	3.75	DK BRN	SILT [illegible]					49:47	3:37	3.75 (13.58 [illegible]
3.33 SURGE 0:53:14	54:54	55:30	3.33	DK BRN	"					56:20	3:06	3.33 (9.99 [illegible]
SURGE 0:59:14	1:1:38	1:2:19	2.92	DK BRN	SILT [illegible]		below surface	16°	390	1:2:50	3:36	2.73 (10.26 [illegible]
							off Bottom	17°	1100			
SURGE 1:10:14	1:12:08	12:44	3.33			6.15	below surface	16°	380	1:13:14	3:17	3.33 (10.7 [illegible]
							off Bottom	17°	400			

CLOCK TIME: 1:14 COUNT DEVELOPMENT TIME: 1 HRS. 13 MIN.

TOTAL DISCHARGE: 86.11 GALLONS # 85.3 WELL VOLUMES

APPROXIMATED TOTAL FINES REMOVED: 0.25 lbs PERSONNEL: [illegible] Cow

WELL DEVELOPMENT PROCEDURE

PROJECT TITLE: SJAFB

WELL NUMBER (AREA): MW-54 (DPDO)

DATE: 25 NOV 86

WATER LEVEL: 12.95' TOTAL DEPTH: 19.54 WELL VOLUME: 1.09 gal

PROCEDURES: • Surge block alternating with overpumping → repeated until fine content is negligible. All equipment cleaned with Alconox soap + TAP RINSE.

CLOCK TIME: 8:31

PUMP START HR:MN:SC	DISCHARGE START	DISCHARGE STOP	DISCHARGE YIELD GAL/MIN	WATER COLOR	SED. CONTENT	pH	PARAMETERS INTERVAL (FT.)	PARAMETERS ToC	PARAMETERS umhos	PUMP STOP HMS	PUMP PERIOD HMS	Q FOR PERIOD GAL
initial parameter measurement							below surface	18'	70			
							OFF BOTTOM	18'	70			
SURGE												
0:14:46	0:17:52	0:18:58	1.40	MILKY [illegible]	3: very fine sd	4.60				0:22:27	0:07:41	10.75
SURGE												
0:25:37	:27:39	:29:24	1.47	"	"					0:32:08	0:06:31	9.17
SURGE												
0:41:35				PUMP	FAILURE							
0:51:35	:52:54	:53:37	2.79	"	NEG SD					0:56:30	0:04:55	13.69
SURGE												
				PUMP	FAILURE							
1:02:31	:05:04	:05:37	3.64	"	NEG SD					1:08:20	0:04:49	17.54
SURGE												
1:11:34	:14:29	:15:32	1.40	lighter [illegible]	NEG SD	4.60	below surface	17	60	1:18:20	0:06:46	9.47
							off bottom	18	70			
				TOTAL	2.5 lbs							

CLOCK TIME: 9:50 COUNT DEVELOPMENT TIME: 1 HRS. 15 MIN.

TOTAL DISCHARGE: 60.62 GALLONS # 55.6 WELL VOLUMES

APPROXIMATED TOTAL FINES REMOVED: 2.5 lbs PERSONNEL: SG, CW

TABLE G-3

GROUNDWATER WITHDRAWAL AND STABILIZATION RECORD

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB Phase II Stage I

WELL NUMBER (LOCATION): MW-11 Fire Training Area

DATE/TIME: 7 Jan 87 (15:05)

WATER LEVEL: 11.70 TOTAL WELL DEPTH: 29.78 WELL VOLUME: 2.98 gal (For 2 " Well, 0.165 gal/foot)

18.08

SAMPLE PARAMETER: [illegible] ADDITIVE: NONE

PROCEDURES/EQUIPMENT: Remove 3 column volumes of water or until parameters stabilize.

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
15:05/0	—	—	—	—	Surface 50 @ 17°C Bottom 70 @ 19°C
15:20/11	~ 1½ gal	dark gray		5.55	51 @ 18°C
15:25/24	~ 3 gal	"		5.55	51 @ 18°C
15:31/40	~ 4½	"		5.56	51 @ 18°C
15:39/55	~ 6 gal	"		5.36	50 @ 18°C
15:47/66		"		5.35	~~45~~ @ 18°C
15:51/74	~ 8 3/4 gal	"		5.30	50 @ 18°C
15:57/75	~ 9.5 gal	"		5.35	45 @ 18°C

TOTAL VOLUME: ______

______ WELL VOLUMES

COMMENTS: No surface film or sheen present on surface of water column. No odor was detected

= 480 mL

Bailer capacity ~~16 oz~~ [small Teflon bailer] 30mL/1oz

d = 20'

AFTER SAMPLING WATER LEVEL 11.82'

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB (2676)

WELL NUMBER (LOCATION): MW 11 FIRE TRAINING AREA

DATE/TIME: 15 JAN 86 / 10:05

WATER LEVEL: 13.33 TOTAL WELL DEPTH: 29.78 [illegible] WELL VOLUME: 2.55 (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: ADDITIVE:

PROCEDURES/EQUIPMENT: REMOVE SUFFICIENT VOLUME OF WATER FROM WELL FOR PARAMETERS TO STABILIZE MINIMUM 3 WELL VOLUMES = 8.64 gal — TANDY RSC, FISHER 107 pH, Peristaltic pump, plastic sealable container, 1/8 1SCT 33

Time/Bail No.	Cumulative Volumes (Gal)	Water Color	Turbidity	pH	Conductivity (umhos)
10 10					SURFACE: 230 @ 19°C BOTTOM: 210 @ 19°C
10 16	1 GAL	GRAY	—	4.75	230 @ 18.5°C
10 21	2 GAL	"	—	5.20	230 @ 19°C
10 26	3 GAL	"	—	5.25	220 @ 19°C
10 32	4 GAL	"	—	5.20	220 @ 19°C
10 35	5	CLEAR	—	5.15	220 @ 19°C
1041	6	"	—	5.15	220 @ 19°
1050	7	"	—	5.20	210 @ 19°

TOTAL VOLUME:

\# WELL VOLUMES

COMMENTS:

1150	8	CLEAR	—	5.15	210	19°
1158	9	"	—	5.15	210	19°

SAMPLING DEPTH 20'

SAMPLE TIME 1100

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB 2676-16

WELL NUMBER (LOCATION): MW-12 LF1

DATE/TIME: ______ x 3 = 4.1 gal

WATER LEVEL: 16.25' TOTAL WELL DEPTH: 24.48 WELL VOLUME: 1.36 (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: Anions; 13 ppm; T.D.S. ADDITIVE: HNO_3

PROCEDURES/EQUIPMENT: End of tube lowered ~4' below top WT
~ ~20.3' below TOC

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
08:52	ϕ				17°, 305 top
					18°, 310 Bottom
09:10	1 gal	lt. brn	lt. brn [illegible]	5.65	17°, 310
09:13	2 gal	"	lighter	5.76	17, 300
0919	3 gal	"	"	5.70	17 300
0915	4 gal	"	"	5.73	17.5 : 300
0924	5 gal	—	~clear	5.75	17 . 310
0935	6 gal	—	"	5.55	17 : 295

TOTAL VOLUME: ______

______ WELL VOLUMES

COMMENTS:

09:42	7 gal	--	clear	5.65	17 310

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB Phase II Stage II

WELL NUMBER (LOCATION): MW-12 (LANDFILL #1)

DATE/TIME: 8 JAN 87 / 10:10 am

WATER LEVEL: 16.50' TOTAL WELL DEPTH: 24.48' WELL VOLUME: 1.48 / 2.97 (For 2" Well, 0.165 gal/foot)

SAMPLE PARAMETER: A/VOC, HVOC, Pet HC EXTRACT ADDITIVE: None

PROCEDURES/EQUIPMENT: BAIL WATER FROM WELL UNTIL PARAMETERS STABILIZE or 3-well volumes

YSI 33 SCT METER, FISHER 107 PH METER, TEFLON BAILER, 400 ml PMP flask.
YSI WATER PROBE

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
10:10/					SURFACE 140 @16°C BOTTOM 220 @17°C
10:20/3		MILKY BRN	>100NTU	5.75	120 @10°C
10:25/11		"	"	5.95	100 @15°C
10:28/22		"	"	5.95	100 @16°C
10:31/26	3 GAL	"	"	5.95	95 @16°C
10:35/32		"	"	5.95	98 @16°C
10:40/39		"	"	5.95	90 @16°C
10:44/44		"	"	5.95	95 @16.5°C
10:48/50	6 GALLON			5.95	92 @16°C

TOTAL VOLUME: 6 GALLON

4.05 WELL VOLUMES

COMMENTS: NO FLOATING CONTAMINANTS OBSERVED FROM BAILER

A/VOC / HVOC: A1...A4 → 4 vials
B1, B2

PET HC: C, D → 2 1-liter bottles

EXTRACT: E1...E2 → 4 1-liter bottles
F1...F2

GROUND WATER LEVEL AFTER BAIL 16.49 FT BTC

d = 20 1/2'

t = 11:00

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB (PHASE II STAGE II)

WELL NUMBER (LOCATION): MW 13 (LANDFILL #4) WITHIN LANDFILL

DATE/TIME: 12 JAN 77 / 8:30

WATER LEVEL: 19.15 TOTAL WELL DEPTH: 25.38 WELL VOLUME: 0.98 gal (For 2 " Well, 0.165 gal/foot) 5.43

SAMPLE PARAMETER: ADDITIVE:

PROCEDURES/EQUIPMENT: REMOVE SUFFICIENT VOLUME FROM WELL FOR PARAMETERS TO STABILIZE OR 3 WELL VOLUMES MINIMUM. YSI 33 SCT METER, FISHER 107 pH METER, TEFLON BAILER, 4l pyrex mixing flask.

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
8:32	—	—	—	—	SURFACE: 1600 @ 19°C BOTTOM: 2000 @ 19°
8:52	12 2 gal	black	>100 NTU	5.40	1100 @ 11°
9:04	28 6 gal	black	~90 NTU	5.30	410 @ 17°
9:15	9 gal	"	"	5.30	410 @ 17°
9:30	12 gal	"	"	5.30	500 @ 17.5
9:38	15 gal	"	"	5.30	400 18
9:45	17 gal	"	≈20	5.25	400 18

TOTAL VOLUME: 17 GAL

17.34 WELL VOLUMES

COMMENTS: SALINITY ~1 PART PER THOUSAND AT 8:32.

NO FLOATING CONTAMINENTS OBSERVED

REVISED CONC. (OVA LOSS OF CHARGE) PRIOR TO WELL VOL.

[illegible] SAMPLES TAKEN IMMEDIATELY ON EACH [illegible] REMOVED DURING PURGING. (4 VIALS)

WELL HAS SET NITING [illegible] SAMPLING

→ PET H.C. SAMPLES TAKEN FROM FIRST [illegible] 4l volume (first four bails discarded, flask rinsed) (7 [illegible]

EXTRACT TAKEN FROM SECOND 4l volume C, D, E1

[illegible] E2

Flask rinsed and bails discarded between parameter [illegible] [illegible] sample

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB

WELL NUMBER (LOCATION): MW 13 LANDFILL 4

DATE/TIME: 21 JAN 87 / 9:24

WATER LEVEL: 19.17 TOTAL WELL DEPTH: 25.38 / 6.21 WELL VOLUME: 1.02 (For 2 " Well, 0.165 gal/foot) 3.07 gal

SAMPLE PARAMETER: INORGANICS ADDITIVE:

PROCEDURES/EQUIPMENT: REMOVE SUFFICIENT WATER VOLUME FROM WELL FOR GIVEN PARAMETERS TO STABILIZE MINIMUM 3 WELL VOLUMES. / YSI 33 SCT METER, FISHER 107 pH METER, PERI-PUMP w/ battery, pyrex (Al) collection flask, plastic container

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
931				6.30	3 ref: 750 @ 19.5°c Boron: 1800 @ 20°c
955	3 GAL	GRAY		6.30	510 @ 16.5°c
1007	6 GAL	CLEAR	—	6.15	335 @ 17°c
1024	9 GAL	"	—	5.70	300 @ 17°c
1047	12 gal	"	—	5.65	285 @ 17°c
1107	15 gal	"	—	5.65	265 @ 17.5°c
1126	18 gal	"	—	5.55	250 @ 17.5°c
1142	21 gal	"	—	5.65	210 @ 17.5°c

TOTAL VOLUME:

WELL VOLUMES

COMMENTS: no floating contaminants observed in discharge water; H_2SO_4 odor from well.

V = 22
t = 15:00

			Tur.	pH		
12[illegible]	24 gal	Clear	—	5.60	220 umhos	17.5
122[illegible]	27 gal	"	—	5.60	230	17.5
1240	30 gal		—	5.60	235	17.5°c
125x	33 gal		—	5.65	230	18.0

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB (PHASE II STAGE I)

WELL NUMBER (LOCATION): W-4 (LANDFILL 4)

DATE/TIME: 9 JAN 87 1530

WATER LEVEL: 8.25 TOTAL WELL DEPTH: 16.62 WELL VOLUME: 1.38 (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: HVOC, TDS, PET HC, EXTRACT ADDITIVE: NONE ; 4°C

PROCEDURES/EQUIPMENT: REMOVE SUFFICIENT WATER VOLUME FOR PARAMETERS TO STABILIZE OR MINIMUM 3 WELL VOLUMES YSI 33 SCT METER, FISHER 107 pH METER, TEFLON BAILER, 4l PYREX MIXING FLASK.

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
1530	—	—	—	—	SURFACE: 300 @ 15°C BOTTOM: 310 @ 17°C
1550	3 GAL	BROWN	>100 NTU	3.45	310 @ 15°C
16:04	4 GAL	"	"	"	290 @ 17°C
16:13	6 Gal	"	"	3.35	280 @ 17°C
1627	8 Gal	"	60 NTU	3.45	270 @ 17°C
16:32	9 GAL	"	"	345	250 @ 17°C
16:40	10 GAL	"	"	345	250 @ 17°C
16:51	11 GAL	"	"	3.45	250 @ 17°C

TOTAL VOLUME: 11 GAL

7.21 WELL VOLUMES

COMMENTS: NO FLOATING CONTAMINANTS PRESENT

NO NOTICEABLE ODORS

4½ bails to bottom of well (INSUFFICIENT VOLUME TO BAIL)

WATER LEVEL 15.61 ft

HVOC, TDS SAMPLES TAKEN IMMEDIATELY FROM LAST BAIL

PET H.C. SAMPLE TAKEN FROM FIRST 4l mixed volume 2.2

EXTRACT SAMPLES TAKEN FROM SECOND 4l mixed volume F.F2 F.F2

SAMPLE DEPTH 16'

sample time 1700 hr WATER LEVEL AFTER SAMPLING 15.51

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFTS (2676)

WELL NUMBER (LOCATION): MW 14 (LANDFILL 4)

DATE/TIME: 20 JAN 87 / 16 18

WATER LEVEL: 7.88 TOTAL WELL DEPTH: 16.42 / 8.54 WELL VOLUME: 1.25 gal (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: INORGANICS ADDITIVE:

PROCEDURES/EQUIPMENT: REMOVE SUFFICIENT WATER VOLUME FROM WELL FOR PARAMETERS TO STABILIZE MINIMUM 3 WELL VOLUMES. / YSI 33 SCT METER, FISHER 107 pH METER, PERI-PUMP W/ BATTERY (12V), 1l collection flask (pyrex), 1 plastic collection container.

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
					SURF: 60 @ 14°C
1620	--	—	—	—	BOTTOM 60 @ 16°C
1641	3 GAL	CLEAR	—	4.30	60 @ 16°C
1658	6 GAL	"	—	4.35	60 @ 16°C
1706	9 Gal	"	—	4.40	60 16.5

TOTAL VOLUME: 9 GAL

______ WELL VOLUMES

COMMENTS: NO FLOATING CONTAMINANTS OBSERVED FROM DISCHARGE WATER; NO UNUSUAL ODORS NOTED.

SAMPLE DEPTH: ~11'

TIME: 1700

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB

WELL NUMBER (LOCATION): WELL 40 (FIRE TRAINING AREA: BACKGROUND)

DATE/TIME: 7 Jan 87 (8:35)

WATER LEVEL: 8.20' TOTAL WELL DEPTH: 14.97' WELL VOLUME: 1.11gal (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: AVOCs/HVOCs; Pet HCs ADDITIVE: NONE

PROCEDURES/EQUIPMENT: REMOVE AT LEAST 3 well volumes OR UNTILL PARAMETERS (T°C, umhos, pH) stabilize. Sample for AVOCs/HVOCs; Pet. HCs

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos) / Temp (°C)	
					50.0	@16°C
0850/	~2 gal	rust orange	>100 NTU	4.20	55.0	14°C
0900/	~4 gal	"	>100 NTU	4.20	60.0	16°C
0905/30	4½ gal	"		4.20	51.0	15.5°
0910/48	6 gal	"	"	"	"	"
	SAMPLE					

TOTAL VOLUME: ____________

____________ WELL VOLUMES

COMMENTS:

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB (PHASE II STAGE II)

WELL NUMBER (LOCATION): MW40 FIRE TRAINING AREA BACKGROUND

DATE/TIME: 13 JAN 87 / 15:50

WATER LEVEL: 8.77 TOTAL WELL DEPTH: 14.70 WELL VOLUME: 5.77 gal (For 2" Well, 0.165 gal/foot)

SAMPLE PARAMETER: LEAD INORGANICS ADDITIVE:

PROCEDURES/EQUIPMENT: REMOVE SUFFICIENT VOLUME FROM WELL FOR PARAMETERS TO STABILIZE MINIMUM 3 WELL VOLUMES YSI 33 SCT METER, FISHER 107 pH METER, PYREX 4L MIXING FLASK

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
		RED	OPAQUE		SURFACE: 240 @ 14°C BOTTOM: 210 @ 16°
16:00	3 GAL	"	"	3.65	190 @ 15°C
16:07	6 GAL	"	"	3.30	180 @ 16°C
16:11	9 GAL	"	"	3.36	150 @ 16°C
16:18	12 GAL	"	"	3.30	140 @ 16°C
16:25	15 GAL	"	"	3.30	140 @ 16°C
16:32	18 GAL	"	"	3.25	125 @ 16°C
16:40	21 GAL	"	"	3.35	110 @ 15°

TOTAL VOLUME:

\# WELL VOLUMES

COMMENTS: NO SURFACE OR FLOATING CONTAMINANT OBSERVED FROM BAILER
NO ODORS

1645	24 GAL	RED	OPAQUE	3.35	100 @ 16°
1650	27 GAL	"	"	3.35	80 @ 16°
1655	30 Gal	"	"	3.35	80 @ 16°C
1700	33 Gal	"	"	3.35	75 @ 16
1707	36 GAL			3.35	65 @ 15°C
1710	39 GAL			3.35	65 @ 15°C
1718	42 GAL			3.40	60 @ 16°
1722	45			3.35	60 @ 15.5°C

1722 → SAMPLE @ 11'-12'

WATER LEVEL 8.79'

$\downarrow$ = 11 1/2'

T = 17.72

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SOAFB 2676-16

WELL NUMBER (LOCATION): MW-41 Fire Trng Area 3

DATE/TIME: 7 Jan. 87 / 16:55

WATER LEVEL: 8.06' (TOC) TOTAL WELL DEPTH: 14.23'/4 = 14.83' WELL VOLUME: 1.0 gal (For 2" Well, 0.165 gal/foot) 6.15' water

SAMPLE PARAMETER: AVOCs/HVOCs, Pt HCs ADDITIVE:

PROCEDURES/EQUIPMENT:

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
16:58 / 0	0	—	—	—	480 @ 15°C (surface WT) 480 @ 17°C (bottom well)
#6		dark brown		5.25	380 14°C
13	~3 gal	"		5.75	375 15°C
17:09 / 21		"		5.65	330 15°C
17:11 / 26	~6 gal	"		5.65	320 15°C
17:12 / 22					

TOTAL VOLUME:

WELL VOLUMES

NOTE

COMMENTS:

(Subtract 3.5' from all preceding total well depth measurements for length of plumb bob)

No sheen, no odor at surface WT

(Bailer vol 750 mL)

8.25' W.L. after sampling

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB (2676)

WELL NUMBER (LOCATION): MW 41 FIRE TRAINING AREA

DATE/TIME: 15 JAN 87 / 1300

WATER LEVEL: 9.85 TOTAL WELL DEPTH: 14.23 WELL VOLUME: 0.72 gal 4.38 (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: ______ ADDITIVE: ______

PROCEDURES/EQUIPMENT: REMOVE SUFFICIENT VOLUME FROM WELL FOR GIVEN PARAMETERS TO STABILIZE MINIMUM 3 WELL VOLUMES. YSI SCT 33 METER pyrex collection flask. fisher 107 pH meter, parristaltic

Time/Bail No.	Cumulative Volumes-( )	Water Color	Turbidity	pH	Conductivity (umhos)
1310					SURF: 575 @ 15.5°C BOT: [illegible] @ 11°C
1319	1 GAL	brn	—	5.55	550 @ 16°C
1325	3 GAL	"	—	5.80	525 @ 16°
1330	5 gal	"	—	5.85	455 @ 16°C
1344	7 gal	"	—	5.85	450 @ 16°C
1350	8 gal	"	—	5.80	420 @ 16°C
1400	9 GAL	"	—	5.80	400 @ 16°C
Equipment	failure				

TOTAL VOLUME: ______

______ WELL VOLUMES

COMMENTS: NO NOTICEABLE SURFACE FILM OR SHEEN IN DISCHARGE WATER

NO unusual odors

1412 Resume

1420	10 gal	brn	—	5.85	320 @ 16°
1427	11 gal	brn	—	5.80	290 @ 16°
1435	12 gal	brn	—	5.85	250 @ 16°
1441	13 gal	"		5.75	230 @ 16°
1447	14 gal	"		5.85	220 @ 16°
1455	15 gal	"	—	5.85	210 @ 16°
1500	16 gal	"	—	5.85	200 @ 16°
1506	17 gal	"	—	5.85	190 @ 16°
1510	18 gal		—	5.85	180 @ 16°
1520	19 gal		—	5.80	170 @ 16°
1530	20 gal		—	5.85	150 @ 16°
1540	21 gal		—	5.75	130 @ 16°

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SVAFB (Phase II Stage II)

WELL NUMBER (LOCATION): MW-42 FIRE TRAINING AREA

DATE/TIME: 8 JAN 82 (8:25am)

WATER LEVEL: 10.83' TOTAL WELL DEPTH: 15.08' (4.25ft) WELL VOLUME: 0.70gal/4.25ft (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: AVOC-HVOC, Pet HC ADDITIVE: NONE

PROCEDURES/EQUIPMENT: HAND BAIL UNTIL PARAMETERS STABILIZE OR AT LEAST 3 WELL VOLUMES.

YSI 33 S-C-T METER, FISHER 107

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
8:30am /					SURFACE 180 @ 15°C BOTTOM 180 @ 15°C
8:40am / 6		MILKY TAN ISH BRN	>100NTU	4.45	190 @ 15°C
8:45am / 11		"	>100NTU	4.45	180 @ 16.5°C
8:46am / 16	3GAL	"	"	4.46	185 @ 16.5°C
8:49am / 22		"	"	4.45	185 @ 16.5°C
8:54am / 30	6 GAL	"	"	4.45	185 @ 16.5°C

TOTAL VOLUME: 6 GAL

8.57 WELL VOLUMES

COMMENTS: NO SURFACE FILM, SHEEN OR FLOATING CONTAMINANT PRESENT ON SURFACE OF STANDING WATER COLUMN.

NO NOTICEABLE ODORS

Pet HC: C1 } 2 CT 1-liter bottles
C2 }

AVOC/HVOC: A1...A2 } 4 VIALS
B1...B2 }

AFTER BAILING WATER LEVEL 10.83 ft

(# = 13)

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB Phase II Stage I

WELL NUMBER (LOCATION): MW-43 Background Well Lan

DATE/TIME. 7 Jan '87 / 11:30

WATER LEVEL: 18.65 TOTAL WELL DEPTH: 24.17 / 5.52 WELL VOLUME: 0.9 gal (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: AHCs/HHCs, Pet HC, Extrac. ADDITIVE: NONE

PROCEDURES/EQUIPMENT: Hand bailing (TEFLON BAILER)

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
11:45 / 0	0	—	—	—	(SURFACE) 35 @ 19°C
					(21') 30 @ 20°C
					(OFF BOTTOM) 20 @ 20°C
11:50 / 7		Rusty milky brown		4.85	32 @ 18°C
11:55 / 19	~ 2 gal	"	>100 NTU	4.20	32 @ 19°
11:00 / 28	~ 3 gal	"		4.20	32 @ 19°
36	~ 4.16	"		4.75	32 @ 19°

TOTAL VOLUME: 4.16 gal

\# 4.570 WELL VOLUMES

COMMENTS:

Rinse proced: soap & water wash
2 tap " rinse
3 d.i. water "
4 methanol "
(add 5 D.i. water as last step)

[illegible] equipment in use within 100 yards: [illegible]
/ [illegible] truck

[illegible] stored [illegible] vicinity

VOID

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: AH

WELL NUMBER (LOCATION):

DATE/TIME:

WATER LEVEL: 11.20 TOTAL WELL DEPTH: 15.05 WELL VOLUME: .64 gal (For 2 " Well, 0.165 gal/foot)

split up

SAMPLE PARAMETER(S) ADDITIVE(S)

PROCEDURES/EQUIPMENT:

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos) TC
1622					70 @16.5 105 @17°
1630	1 gal	Brn	–	435	60 @ 16°C
1642	3 gal	"	—	445	50 @ 16°C
1657	5 gal	"	—	445	50 @ 16°

TOTAL VOLUME: REMOVED

WELL VOLUMES

COMMENTS:

ADD sample ID #

SAMPLE DEPTH

SAMPLE TIME

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: S.A.F.. 7(.7(

WELL NUMBER (LOCATION): MW47 [illegible]

DATE/TIME: 15 JAN 77 / 1620

WATER LEVEL: 11.7.0 TOTAL WELL DEPTH: 15.0 WELL VOLUME: 0.64 3.296 (for 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: ______ ADDITIVE: ______

PROCEDURES/EQUIPMENT: REMOVE SUFFICIENT VOLUME FROM WELL FOR GIVEN PARAMETERS TO STABILIZE MINIMUM 3 WELL VOLUMES (1.92 gal). YSI SCT 33 METER FISHER

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
1622					SURF 70 @ 16.5°C BOTT 65 @ 16.5°
1630	1 gal	BRN	–	4.35	60 @ 16°
1642	3 gal	"	–	4.45	50 @ 16°C
1652	5 gal	CLEAR	–	4.45	50 @ 16°C
1657	6 gal	"	–	4.50	45 @ 16.5°C
1705	8 gal	"	–	4.50	45 @ 16.5°C

TOTAL VOLUME: ______

______ WELL VOLUMES

COMMENTS: NO VISIBLE SURFACE FILM OR SHEEN ON DISCHARGE WATER NO NOTICEABLE ODORS

SAMPLE TIME: 1706

SAMPLE DEPTH: 13.0'

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB (2676)

WELL NUMBER (LOCATION): MW43 LANDFILL 4

DATE/TIME: 14 JAN 97 / 1400

WATER LEVEL: 19.14 TOTAL WELL DEPTH: 24.17 5.53 WELL VOLUME: 0.91 gal (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: ADDITIVE:

PROCEDURES/EQUIPMENT: REMOVE SUFFICIENT VOLUME FOR PARAMETERS TO STABILIZE PARAMETERS USING PERISTALTIC PUMP MINIMUM 3 WELL VOLUMES.

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos) Surface: 227 @ 20°C Bottom: 125 @ 20°C
15:57	1 gal	light brown	very light to clear	5.30	19°C : 230 umhos
16:05	2 gal	"	none	4.70	20°C : 210
16:10	3 gal	clear	none	4.65	20°C : 200
16:15	4 gal	"	"	4.75	20°C : 200
16:23	4½ gal	"	"	4.70	19½° : 182
16:30	5½ gal	"	"	4.55	19½° : 165
16:40	6½ gal	"	"	4.70	19½° : 145

TOTAL VOLUME:

WELL VOLUMES

COMMENTS:

Used peristaltic pump for well purge ; flow ~ 600 mL/min. End of tube weighted with 5½" weight and lowered ~ 8" into WT.

16:45	7½ gal	"	"	4.70	19½	135 umhos
16:55	8½ gal	"	"	4.70	19.5	110
17:05	9½ gal	"	"	4.70	20°	95
17:10	10½ gal	"	"	4.70	19.5	85
17:16	11½ gal	"	"	4.75	19.5°	75
17:19	12½ gal	"	"	4.70	19.5	60
17:27	13¾ gal	"	"	4.65	19.5	55
17:37	14½ gal	"	"	4.70	19.5	52

(out of seq. ok)

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB (PHASE II STAGE II)

WELL NUMBER (LOCATION): MW-44

DATE/TIME: 5 JAN 82 (14:40)

WATER LEVEL: 4.92 TOTAL WELL DEPTH: 15.25' WELL VOLUME: 1.70 gal (For 2 " Well, 0.165 gal/foot) (10.33)

SAMPLE PARAMETER: AVOC-HVOC, PET HC, EXTRAC ADDITIVE: NONE

PROCEDURES/EQUIPMENT: BAIL WELL UNTIL PARAMETERS STABILIZE OR REMOVE 3 WELL VOLUMES MINIMUM

YSI 33 SCT METER, FISHER 107 pH METER, TEFLON BAILER [illegible]

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
14:40		—	—		SURFACE 120 @ 15°C BOTTOM 140 @ 15°C
14:46/3		DARK BLACK	>100 NTU	4.10	70 @ 13.5°C
14:51/14		"	"	4.10	80 @ 14.0°C
14:55/24	3 GALLONS	"	"	4.11	80 @ 14.0°C
14:58/31		"	"	4.10	80 @ 14.0°C
49	6 GALLONS	"	"	4.10	79 @ 14.0°C
15:00 → SAMPLE					

TOTAL VOLUME: 6 GALLONS

3.53 WELL VOLUMES

COMMENTS: NO FLOATING CONTAMINANTS OBSERVED FROM BAILER.

STRONG ORGANIC ODOR PRESENT

(SAMPLING DEPTH: ~ 8 ft)

AVOC / HVOC A1 A2 } 4 VIALS
B1 B2

PET. H.C. : C D → 2 1-l bottles

EXTRACTABLES E1 E2 } 4 1l bottles
F1 F2

C, E1, E2 SAMPLES FROM FIRST 4l mixed volume

D, F1, F2 [illegible] SECOND 4l mixed volume

WATER LEVEL [illegible]

3 BAILERS DISCARDED BEFORE FILLING SECOND 4l volume

t = 1200

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: [illegible]

WELL NUMBER (LOCATION): MW 44 (LANDFILL 4)

DATE/TIME: 16 JAN [illegible] / 1050

WATER LEVEL: 4.95 TOTAL WELL DEPTH: 15.25 WELL VOLUME: 1.70 gal (For 2" Well, 0.165 gal/foot)

SAMPLE PARAMETER: ______ ADDITIVE: ______

PROCEDURES/EQUIPMENT: REMOVE SUFFICIENT VOLUME FROM WELL FOR PARAMETERS TO STABILIZE MINIMUM 3 WELL VOLUMES (5.1 gal) / YSI 33 SCT METER FISHER 107 pH meter glass collection flask plastic collection container, peri-pump

Time/Bail No.	Cumulative Volumes GAL	Water Color	Turbidity	pH	Conductivity (umhos)
1040					SURF 130 @ 14° BOT 125 @ 15
1055	2	brn	—	4.35	100 @15°
1110	3	"	—	4.25	90 @15°
1120	6	clear	—	4.25	70 @15°
1135	9	"	—	425	60 @15°
1153	12	"	—	425	60 @15°

TOTAL VOLUME: 12

~7 WELL VOLUMES

COMMENTS: NO FLOATING CONTAMINANT OBSERVED IN DISCHARGE WATER

ORGANIC ODOR NOTED

SAMPLE CONTAINERS ARE FLUSHED WITH WATER FROM WELL BEFORE SAMPLE VOLUMES ARE COLLECTED

sample depth ~ 10'

sample time ~ 1200

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB PHASE II STAGE II

WELL NUMBER (LOCATION): MW-45 (LANDFILL 4)

DATE/TIME: 8 JAN 87 / 13:50

WATER LEVEL: 4.45' TOTAL WELL DEPTH: 13.88' WELL VOLUME: 1.55 / 4.43 (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: HVOC, AVOC, PETHC, EXT ADDITIVE: NONE

PROCEDURES/EQUIPMENT: BAIL WELL UNTIL PARAMETERS STABILIZE OR 3 WELL VOLUMES MINIMUM. SAMPLES ARE DRAWN

YSI 33 S.C.T METER, FISHER 107 pH METER, TEFLON BAILER, PYREX 4l FLASK

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
13:50	—	—	—	—	SURFACE 70 @ 4°C BOTTOM 65 @ 16°C
13:51/3		GRAY-BLACK	>100 NTU	5.15	68 @ 16°C
14:00/18		"	"	5.10	70 @ 15°C
14:00/19	3 GALLONS	"	"		
14:04/25		"	"	5.10	70 @ 15°C
14:06/33		"	"		70 @ 15°C
34	6 GALLON				
35		"	"	5.10	70 @ 15°C

TOTAL VOLUME: ~ 6 GALLONS

3.87 WELL VOLUMES

14:15 → SAMPLE

COMMENTS: No floating contaminants observed from bailer.
Strong organic odor present
(SAMPLING DEPTH ~ 8 ft BTC)
HVOC/AVOC : A1 .. A2 } 4 VIALS
B1 .. B2
PET. HC .. C .. D - 2 1 liter bottles
EXTRACT E1 E2 }
F1 .. F2 } 4 1 liter bottles
* C, D, E1 SAMPLES TAKEN FROM FIRST MIXED 4l VOLUME
E2, F1, F2 SAMPLES TAKEN FROM SECOND MIXED 4l VOLUME
2 BAILERS DISCARDED BEFORE FILLING SECOND 4l VOLUME
WATER LEVEL AFTER BAILING 4.50 ft TC

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB (2676)

WELL NUMBER (LOCATION): MW 45 LANDFILL U

DATE/TIME: 16 JAN 87 / 1435

WATER LEVEL: 4.45 TOTAL WELL DEPTH: 13.88 WELL VOLUME: 1.56 (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: ADDITIVE:

PROCEDURES/EQUIPMENT: REMOVE SUFFICIENT WATER VOLUME FOR GIVEN PARAMETERS TO STABILIZE MINIMUM 3 WELL VOLUMES (~5 GAL) / YSI SCT 33 METER FISHER 107 pH METER pyrex collection flask plastic collection container peri pump

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
1437					SURF: 80 @ 14.5 C Bottom 80 @ 16
1450	2	Clear	—	5.15	75 @ 15° C
1454	3	"	—	5.05	75 @ 15° C
1510	6	"	—	5.15	80 @ 15°
1522	9	"	—	5.10	80 @ 15°
	10	"	—	5.10	80 @ 15°

TOTAL VOLUME:

WELL VOLUMES

COMMENTS: NO FLOATING CONTAMINANT OBSERVED IN DISCHARGE WATER

Sampling depth ~ 9 ft
Sample ~1530 hr

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SUAFB (PHASE II STAGE II)

WELL NUMBER (LOCATION): MW-46 (LANDFILL 4)

DATE/TIME: 8 JAN 87 / (16:50 hr)

WATER LEVEL: 4.20 TOTAL WELL DEPTH: 13.75' WELL VOLUME: 1.57 (For 2 " Well, 0.165 gal/foot)
9.55

SAMPLE PARAMETER: [illegible] ADDITIVE: NONE / 4°C

PROCEDURES/EQUIPMENT: REMOVE SUFFICIENT VOLUME FROM WELL FOR PARAMETERS TO STABILIZE OR MINIMUM 3 WELL VOLUMES. YSI 33 SCT METER, FISHER INTRO pH METER, TEFLON BAILER, 40 DUCKY mixing [illegible]

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
16:54	—	—	—	—	SURFACE 1000 @8 BOTTOM 1100 @10
16:55	2	[illegible]	~80 NTU	6.45	1000 @ 7.5°C
17:00	15 3 GAL		~85 NTU	6.50	1000 @ 9.0°C
17:04	23	"	"	6.45	1000 @ 10°C
17:06	33 6 GAL	"	"	6.45	1000 @ 10°C
17:06	34	"	"	6.45	1000 @ 10°C
17:06	SAMPLE				

TOTAL VOLUME: 6 GAL

3.82 WELL VOLUMES

COMMENTS: NO FLOATING CONTAMINANTS OBSERVED
STRONG ORGANIC ODOR

SAMPLE DEPTH: 5ft

SAMPLE TIME: 1700

HVOCs/AVOCs TAKEN IMMEDIATELY ON LAST BAIL

FIRST 4l SAMPLE C...D

SECOND 4l SAMPLE E1 E2 F1 F2

4 BAIL: DISCARDED AND FLASK RINSED [illegible]

[illegible]

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB (2676)

WELL NUMBER (LOCATION): MW 46 (LANDFILL 4)

DATE/TIME: 16 JAN 87 / 1700

WATER LEVEL: 4.22 TOTAL WELL DEPTH: 13.75 WELL VOLUME: 1.56 (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: ADDITIVE: 9.48

PROCEDURES/EQUIPMENT: REMOVE SUFFICIENT VOLUME FROM WELL FOR GIVEN PARAMETERS TO STABILIZE MINIMUM 3 WELL VOLUMES (~5 gal) / YSI 33SCT METER FISHER 107 pH meter, pari-pump, 4 l pyrex collection flask plastic collection containe.

Time/Bail No.	Cumulative Volumes (Gal)	Water Color	Turbidity	pH	Conductivity (umhos)
1624					SURF 800 9.5°C BOTTOM 800 11°C
1622	3	CLEAR	—	6.55	800 @ 12°C
1638	6	"	—	6.45	650 @ 12.5°
1646	9	"		6.45	550 @ 12°
1708	12	"	—	6.35	500 @ 12.5
1724	15	"	—	6.35	490 @ 12.5
1738	18			6.30	490 @ 12.5

TOTAL VOLUME: ______

______ WELL VOLUMES

COMMENTS: NO FLOATING CONTAMINANTS OBSERVED IN DISCHARGE WATER STRONG ORGANIC ODOR.

sample time 1730

depth ~9'

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB (Phase II Stage II)

WELL NUMBER (LOCATION): MW-47 (Landfill 4)

DATE/TIME. 9 Apr 87 (9:15 hr)

WATER LEVEL: 5.10' TOTAL WELL DEPTH: 15.28 WELL VOLUME: 1.68 gal (For 2" Well, 0.165 gal/foot) 10.18

SAMPLE PARAMETER: AVOC, HVOC, PET. H.C. EXTRACT ADDITIVE: NONE

PROCEDURES/EQUIPMENT: BAIL SUFFICIENT VOLUME FOR PARAMETERS TO STABILIZE OR MINIMUM 3 WELL VOLUME.

YSI 33 SCT METER, FISHER 107 pH METER, VOD WATER MARKER, TEFLON BAILER, 4l PYREX MIXING FLASK.

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
					SURFACE: 400 @ 9°C
9:20 hr	—	—	—	—	ROOM: 405 @ 11°C
3/9:25 hr		MILKY BRN	>100 NTU	5.36	420 @ 8°C
22/9:32 hr		"	"	5.25	420 @ 8.5°C
9:33/25	3 GAL	"	"	5.25	420 @ 10°C
9:35/30		"	"	5.20	420 @ 10°C
9:40/49		"	"	5.20	420 @ 10°C
9:42/54	6 GAL	"	"	5.20	420 @ 10°C
9:43/58		"	"	5.20	425 @ 10°C

TOTAL VOLUME: 6 GALLONS

= 3.57 WELL VOLUMES

COMMENTS: NO FLOATING CONTAMINANTS OBSERVED

NO NOTICEABLE ODORS

HVOC/AVOC : 4 vials

PET H.C : C..D 2 1l bottles

EXTRACTABLES: F1...F2 } 4 1l bottles

F1...F2 }

HVOC/AVOC TAKEN IMMEDIATELY AT LAST BAIL

FIRST 4l MIXED VOLUME: SAMPLES C D E1

SECOND 4l MIXED VOLUME: SAMPLES E2 F1 F2

FLASK WAS RINSED WITH WATER FROM WELL BETWEEN VOLUMES

AND FIRST 11 BAILS DISCARDED BETWEEN VOLUMES

AFTER BAILING 5.15' WATER LEVEL

SAMPLE DEPTH 10'

SAMPLING TIME 9:15

5

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB (21.76)

WELL NUMBER (LOCATION): MW #2 (LANDFILL II)

DATE/TIME: 20 JAN 87 / 9:20

WATER LEVLL: 4.45 TOTAL WELL DEPTH: 15.28 WELL VOLUME: 1.79 gal / 10.83 (For 2 " Well, 0.165 gal/foot) 3x (5.36)

SAMPLE PARAMETER: ADDITIVE:

PROCEDURES/EQUIPMENT: REMOVE SUFFICIENT VOLUME FROM WELL FOR PARAMETERS TO STABILIZE, MINIMUM 3 WELL VOLUMES (5.36 gal) PERI-PUMP, TYGON TUBE, PYREX (1 l) collection flask, 1-plastic collection container, YSI 33 SCT METER, FISHER 107 pH METER

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
				4.95	SURFACE: 435 @ 9°C BOTTOM: 435 @ 11.5°C
939	3 gal	Clear Gry	750	4.95	~~37~~ 395 umhos 9°C
955	6 gal	" "	750	4.90	380 9°C
1010	9 gal	" "	"	5.00	370 9°C
1026	12 gal	" "	"	5.00	345 9.5°C
1040	15 gal	" "	"	5.00	315 9.25
1054	18 gal	" "	"	5.00	315 9.25
1108	21 gal	" "	"	5.00	315 9.50

TOTAL VOLUME: 21 gal

11.73 WELL VOLUMES

COMMENTS: NO FLOATING CONTAMINANTS OBSERVED IN DISCHARGE WATER. NO NOTICEABLE OR UNUSUAL ODORS

SAMPLE DEPTH ~9'

SAMPLE TIME 1100

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB (Phase II Stage II)

WELL NUMBER (LOCATION): MW-4S

DATE/TIME: 9/14/87 / 10:30 hr

WATER LEVEL: 2.75' TOTAL WELL DEPTH: 24.43' WELL VOLUME: 3.57 (For 2" Well, 0.165 gal/foot)

SAMPLE PARAMETER: [illegible] ADDITIVE: NONE (TEMP)

PROCEDURES/EQUIPMENT: BAIL SUFFICIENT VOLUME TO STABILIZE GIVEN PARAMETERS OR THREE WELL VOLUMES MINIMUM. YSI 33 SCT METER, FISHER [illegible] pH METER, [illegible] TEFLON BAILER, PYREX [illegible] MIXING FLASK.

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
					SURFACE: 250 @ 15°C
10:37	-	-	-	-	Bottom: 245 @ 17.5°C
10:48/3		TAN BRN	~5 NTU	5.90	205 @ 11°C
	10/3 GAL				
10:51/11		DARKER BRN	>100 NTU	5.55	200 @ 16.5°C
19	16 GAL	"	"	5.55	190 @ 16.5°C
24		"	"	5.60	175 @ 16.5°C
29	19 GAL	"	"	5.50	160 @ 16.5°C
38	12 GAL	"	"		150 @ 16.5°C

TOTAL VOLUME: (33 GAL)

9.24 WELL VOLUMES

COMMENTS: NO NOTICEABLE ODORS

NO FLOATING CONTAMINANTS OBSERVED

1105/50	15 GAL	DARK BRN	>100 NTU	5.50	135 @ 17°C
1109/57		"	GET. CLEARER <100 NTU	5.50	120 @ 17°C
60	18 GAL	GRAY BRN	"	5.50	110 @ 17°C
66		GRAY BRN	"	5.50	110 @ 17°C
71	21 GAL				
80	24 GAL	"	"	5.50	100 @ 17°C
90	27 GAL	"	"	5.50	100 @ 17°C
100	30 GAL	"	"	5.50	100 @ 17°C
11:30/110	33 GAL	"	"	5.50	100 @ 17°C

SAMPLE TIME 11:30

[illegible]

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB (2676)

WELL NUMBER (LOCATION): #48

DATE/TIME: 1/20/97 1205.

WATER LEVEL: 1.44' TOTAL WELL DEPTH: 24.43 WELL VOLUME: 3.79 (For 2 " Well, 0.165 gal/foot) 11.38
22.19

SAMPLE PARAMETER: INORGANICS ADDITIVE:

PROCEDURES/EQUIPMENT: REMOVE SUFFICIENT WATER VOLUME FROM WELL FOR PARAMETERS TO STABILIZE MINIMUM 3 WELL VOLUMES (11.38 gal) YSI 33 SCT METER, FISHER 107 pH METER, 1L pyrex collection flask, 1 plastic collection container, peri-pump w/marine battery.

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
1205	—	—	—	—	TOP 330 umhos 10°C Bottom 330 umhos 17°C
1230	3 GAL	CLEAR	—	5.35	350 @ 15°
EQUIPMENT FAILURE					
1446	3 GAL	CLEAR	—	5.20	325 @ 15°C
1458	6 GAL	"	—	5.00	330 @ 16°C
1515	9 GAL	"	—	5.05	329 @ 16°C
1528	12 GAL			5.05	335 @ 16°C
1545	15 GAL	"	—	5.05	330 @ 16°C

TOTAL VOLUME: 15 GAL

3.96 WELL VOLUMES

COMMENTS: NO FLOATING CONTAMINANTS OBSERVED IN DISCHARGE WATER. NO NOTICEABLE UNUSUAL odors noted.

Sample Depth ~ 8'

SAMPLE TIME 1600

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAF (PHASE II STAGE II)

WELL NUMBER (LOCATION): MW U9 (CHA... (LANDFILL 4)

DATE/TIME: 9 JAN 87 / 12:00

WATER LEVEL: 4.90 TOTAL WELL DEPTH: 12.83' WELL VOLUME: 1.31 gal (For 2" Well, 0.165 gal/foot)

SAMPLE PARAMETER: ____ ADDITIVE: ____

PROCEDURES/EQUIPMENT: BAIL SUFFICIENT WATER VOLUME FOR PARAMETERS TO STABILIZE OR 3 WELL VOLUMES MINIMUM.
YSI 33 SCT METER; FISHER ... pH METER;

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
1201	—	—	—	—	SURFACE 1500 @ 11°C BOTTOM 1200 @ 10°C
4		MILKY BRN	>100 NTU	5.10	900 @ 10.5°C
16	3 GAL	"	"	5.00	850 @ 11°C
1214 / 26		"	"	5.00	700 @ 11°C
1217 / 32	6 GAL	"	"	5.00	650 @ 11°C
1220 / 50	9 GAL	"	"	5.00	550 @ 11°C
1229 / 64	11 GAL	"	"	5.00	550 @ 11°C
1233 / 69	12 GAL	"	"	5.00	350 @ 11°C

TOTAL VOLUME: ____

~~5.0~~ 23 WELL VOLUMES

COMMENTS: NO FLOATING CONTAMINANTS RECEIVED FROM BAILER
NO ODORS NOTICED (ORGANIC)

1237 / 83	14 GAL	MILKY BRN	>100 NTU	5.00	350 @ 11°C
1241 / 88	15 GAL	"	"	5.00	310 @ 14°C
1250 / 114	17 Gal	"	>100 NTU	5.25	270 14°C
1252 121	18 Gal	"			
1256 / 152	20 Gal	"	>100 NTU	5.35	235 14°C
1258 / 160	21 Gal	"	>100 NTU	5.35	210 14°C
1307 / X	24	"	"	5.35	185 14°C
X	27 GAL	"	"	5.35	110 14°C
	30 GAL	"	"		

SAMPLE DEPTH: 5.4'
SAMPLE TIME: 13 40

X	33	"	"	5.35	... 14°C
	36		"	5.35	" " °C

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB (2676)

WELL NUMBER (LOCATION): MW 49

DATE/TIME: 1/20/87 1140

WATER LEVEL: 4.05' TOTAL WELL DEPTH: 12.83 WELL VOLUME: 1.45 (For 2 " Well, 0.165 gal/foot) 4.35
8.78

SAMPLE PARAMETER: INORGANICS ADDITIVE:

PROCEDURES/EQUIPMENT: Sample Pulled from 8' Below Casing

REMOVE SUFFICIENT WATER VOLUME FROM WELL FOR PARAMETERS TO STABILIZE / YSI 33 SCT METER FISHER 107 pH METER, PERI-PUMP w/marine battery, the pipe collection flask plastic collection container

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
—	—	—	—	—	SUR: 410 @ 9 °C BOTTOM: 425 @ 12 °C
1156	3 gal	Clear/gray	>50	6.00	455 9°C
1212	6 gal	" "	"	5.95	430 9°C
1237	9 GAL	"	"	5.70	455 @ 10 °C
1253	12 GAL	"	"	5.65	470 @ 10 °C
1310	15 gal	"	"	5.50	460 10.25
1329	18 gal	"	"	5.45	450 11
1346	21 gal	"	"	5.45	420 11
1404	24 gal	"	"	5.40	430 11.00

TOTAL VOLUME: 24 gal

11.55 WELL VOLUMES

COMMENTS:

1415 27 gal 5.45 430 11

NO FLOATING CONTAMINANTS OBSERVED IN DISCHARGE WATER. NO UNUSUAL ODORS NOTED

SAMPLE TIME: 1430

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB PHASE II STAGE II

WELL NUMBER (LOCATION): MW 50 BACKGROUND (LANDFILL 3)

DATE/TIME: 7 JAN 87 / 13:45

WATER LEVEL: 11.65 TOTAL WELL DEPTH: 18.98 WELL VOLUME: 1.21 gal (For 2 " Well, 0.165 gal/foot) 7.33

SAMPLE PARAMETER: AVOC/HVOC, HC ETHER ADDITIVE: NONE

PROCEDURES/EQUIPMENT: OPAQUE TEFLON BAILER USED TO REMOVE COLUMN VOLUMES AND EXTRACT SAMPLES.

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
13:45/0					SURFACE 40 @ 15°C BOTTOM 29 @ 16°C
13:55/	~1/2 gal	lt brownish tan		4.60	20 @ 16°c
14:00/ 12	~1 3/4 gal	"		4.60	20 @ 16 C
14:05/ 18		"		4.60	20 @ 16°C
14:08/ 24	~3 gal	"		4.60	20 @ 16°C
14:10/30	~3 1/4 gal	"		4.65	20 @ 16°c

TOTAL VOLUME: ______

______ WELL VOLUMES

COMMENTS:

Water contain very fine sand.

Bailer ~700 mL capacity

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB

WELL NUMBER (LOCATION): MW-50 (LF3) by trailer park

DATE/TIME: 15 Jan '87 08:40

WATER LEVEL: 12.4' TOTAL WELL DEPTH: 18.98 WELL VOLUME: 1.12 gal (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: ADDITIVE:

PROCEDURES/EQUIPMENT: Peristaltic pump used for purging; lower tube end lowered to ~ 15.6', ~ middle water column (~ 3.4' below WT dep).

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
0840/0	Ø	-	-	-	15°C; 115 umhos top WT
	Ø	-	-	-	15.5°C, 115 bot well
49	~1 gal	light brown	-	4.20	15.0°, 120
0857 905	~2 gal	clear	Ø	4.15	15.0°, 120
905 909	~3 gal	"	-	4.20	16.0; 105
909 913	~4 gal	"	-	4.20	16.0, 118
9:26	5 gal	"	-	4.20	16°; 110

TOTAL VOLUME:

\# WELL VOLUMES

COMMENTS:

3 × 1.12 gal = 3.36 gal.

Sample at 09:30

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB (PHASE II STAGE II)

WELL NUMBER (LOCATION): MW 51 LANDFILL 3

DATE/TIME: 12 JAN 87 / 1500

WATER LEVEL: 5.65 TOTAL WELL DEPTH: 9.44' WELL VOLUME: 0.63 / 3.79 (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: AVOC/HVOC/PET HC/EXTRAC. ADDITIVE: NONE ; @ 4°C

PROCEDURES/EQUIPMENT: REMOVE SUFFICIENT VOLUME FROM WELL FOR PARAMETERS TO STABILIZE — MINIMUM 3 WELL VOLUMES / YSI 33SCT METER, FISHER 107 pH METER TEFLON BAILER, 40 pipet mixing flask (Equipment set 1 & 5)

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
1505	—	—	—	—	SURFACE 300 @ 10°C BOTTOM 340 @ 10°C
1510 10/	3 GAL	BRN	>100 NTU	5.70	390 @ 10°C
1516 20/	6 GAL	"	"	5.65	380 @ 10°C
1524 30/	9 GAL	"	"	5.65	400 @ 10°C
1528 40/	12 GAL	"	"	5.65	400 @ 10°C
15:35 50/	15 GAL	"	"	5.65	400 @ 10°C
15:36	(SAMPLE) @ ~8'				

TOTAL VOLUME: ~15.0 GAL

23.80 WELL VOLUMES

COMMENTS: NO FLOATING CONTAMINENTS OBSERVED FROM BAILER ORGANIC ODOR

HVOC / AVOC : A1 0264 B1 0266
A2 0265 B2 0267

TAKEN FROM LAST BAIL

PET H.C : C 0269 } TAKEN FROM FIRST [illegible]
D 0270

EXTRACTABLES : E1 0271 F1 0273
E2 0272 F2 0274

FIRST 40 mixed volume C, D E1

SECOND 40 mixed volume E2, F1 F2

WATER LEVEL AFTER SAMPLING 5.70

d = 8' t = 15:36

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB (2674)

WELL NUMBER (LOCATION): MW 51 (LANDFILL 3)

DATE/TIME: 21 JAN 86 / 1420

WATER LEVEL: 4.10 TOTAL WELL DEPTH: 9.44 WELL VOLUME: 0.85 (For 2 " Well, 0.165 gal/foot)
5.34

SAMPLE PARAMETER: INORGANIC ADDITIVE:

PROCEDURES/EQUIPMENT:

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
					SURFACE: 470@ 10° BOTTOM: 485@10.5°
1430	3 gal	Clear	–	6.05	470 9.75
1450	6 gal	"	–	6.00	465 9.75
1505	9 gal	"	–	6.06	495 10.00
1518	12 gal	"	–	6.05	495 @10.0 °C
1535	15 gal	"	–	6.00	495@ 10°C

TOTAL VOLUME: 15

17.05 WELL VOLUMES

COMMENTS: NO FLOATING CONTAMINANTS OBSERVED ON SURFACE OF DISCHARGE WATER. NO UNUSUAL ODOR.

SAMPLING DEPTH -6'

SAMPLING TIME 1600

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: S.AFB (PHASE II STAGE II)

WELL NUMBER (LOCATION): MW 52 (LANDFILL 3)

DATE/TIME: 13 JAN 87 / 8:38

WATER LEVEL: 4.15 TOTAL WELL DEPTH: 9.79 WELL VOLUME: 0.93 (For 2" Well, 0.165 gal/foot)

SAMPLE PARAMETER: [illegible] /AVOC PET HC, EXTR ADDITIVE: NONE [illegible]

PROCEDURES/EQUIPMENT: REMOVE SUFFICIENT VOLUME FROM WELL FOR PARAMETERS TO STABILIZE MINIMUM 3 WELL VOLUMES [illegible] METER FISHER [illegible] METER [illegible] (EQUIPMENT [illegible])

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
8:40	—	—	—	–	SURFACE: 700 @ 11°C [illegible] @ 12°C
8 50/18	3 GAL	GRAY	>100NTU	5.75	650 @ 11°
905/36	6 GAL	"	"	5.75	650 @ 11°
915/54	9 GAL	"	"	5.75	650 @ 11°
930 →	SAMPLE	@ ~7'			

TOTAL VOLUME: 9 GAL

9.68 WELL VOLUMES

COMMENTS: NO SURFACE CONTAMINATION [illegible] ORGANIC ODOR

HVOC /AVOC A1(0275) A2(0276) B1(0277) B2(0279)

PET H.C. : C(0280) D(0281)

EXTRACTABLE E1(0282) [illegible] F1(0283) F2(0284)

FIRST 4L MIXED VOLUME: E1, F1, F2

SECOND 4L MIXED VOLUME: [illegible]

[illegible] TAKEN IMMEDIATELY FROM LAST BAIL [illegible] AND AT LEAST 11 BAILS DISCARDED BETWEEN MIXED VOLUMES

$l = 7'$

$t = 0{-}1.30$

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB

WELL NUMBER (LOCATION): MW-52

DATE/TIME: 1/28/87 0910

WATER LEVEL: 4.00' TOTAL WELL DEPTH: 9.79 WELL VOLUME: ____ (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: ____ ADDITIVE: ____

PROCEDURES/EQUIPMENT: PERISTALTIC PUMP w/ BATTERY, pyrex, plastic flasks YSI 33 SCT METER, FISHER 107 pH METER

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)	
	—	—	—	—	600 @ 11°C	surface
	—	—	—	—	600 @ 11°C	bottom
0933	3 gal	Clear	—	6.35	520	6°C
0948	6 gal	"	—	6.45	460	9.5°C
1004	9 gal	"	—	6.45	440	9.5°C
1018	12 gal	"	—	6.45	550	9.25
1034	15 gal	"	—	6.45	550	9.50
1047	18 gal	"	—	6.45	480	9.50

TOTAL VOLUME: ____

____ WELL VOLUMES

COMMENTS:

Time	Vol	Color	Turbid	pH	Cond.	Temp
1100	21 gal	Clear	—	6.45	580	9.75
1115	24 gal	"	—	6.45	480	9.75
1130	27 gal	"	—	6.45	600	9.75
1144	30 gal	"	—	6.45	470	10.50
1158	33 gal	"	—	6.45	600	10.00
1210	36 gal	"	—	6.45	540	10.00
1223	39 gal	"	—	6.50	460	10.00
1234	42 gal	"		6.40	560	[illegible]
1253	43 gal			6.45	460	10.0

(over)

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB Phase II Stage II

WELL NUMBER (LOCATION): MW 3 (Landfill 3)

DATE/TIME: 12 JAN 87 / 16:00

WATER LEVEL: 4.15 TOTAL WELL DEPTH: 10.83 WELL VOLUME: 1.11 gal / 6.77 (For 2" Well, 0.165 gal/foot)

SAMPLE PARAMETER: HVOC/AVOC, Pet.H.C. ADDITIVE: NONE; @ 4°C

PROCEDURES/EQUIPMENT: REMOVE SUFFICIENT VOLUME FROM WELL FOR PARAMETER TO STABILIZE OR 3 WELL VOLUMES MINIMUM. YSI 33 SCT METER, FISHER 107 pH METER, TEFLON BAILER AND 4 l mixing flask (Equipment set 2 & 3).

Time/Bail No.	Cumulative Volumes (Gal)	Water Color	Turbidity	pH	Conductivity (umhos)
1607	—	—	—	—	Surface: 200 @ 12°C Bottom: 200 @ 14°
1616/14	3 GAL	Gry Brn	>100 NTU	5.65	600 @ 12°C
1622/28	6 GAL	"	"	5.65	~505 @ 12°C
1627/42	9 GAL	"	"	5.65	~450 @ 12°C
1632/56	12 GAL	"	"	5.65	440 @ 12°
1637/70	15 GAL	"	"	5.65	420 @ 12°
1641/84	18 GAL	"	"	5.65	410 @ 12°
1646/98	21 GAL	"	"	5.65	390 @ 12°

TOTAL VOLUME: 39 GAL

37.89 WELL VOLUMES

COMMENTS: No FLOATING CONTAMINANTS OBSERVED FROM BAILER. ORGANIC ODOR

AVOC / HVOC : A1 (0286) A2 (0287), B1 (0288), B2 (0289)
PET. H.C. : C (290), D (291)
EXTRACTABLES : E1 (0293), E2 (0294) F1 (0295) F2 (0296)
AVOC / HVOC SAMPLES TAKEN IMMEDIATELY ON LAST BAIL
SAMPLES FROM FIRST 4l MIXED VOLUME C, D, E1
SAMPLES FROM SECOND 4l MIXED VOLUME E2, F1, F2
FLASK RINSED AND FIRST 4l BAIL DISCARDED BETWEEN MIXED VOLUMES.
WATER LEVEL AFTER SAMPLING 4.15'

1655/102	24 gal	Gry Brn	>100 NTU	5.6[illegible]	395 12°C
1659/116	27 gal	Gry Brn	[illegible]	[illegible]	39[illegible] 11.5°C
1702/130	30 gal	[illegible]	[illegible]	5.70	385 11.5°C
1705/134	33 gal	Gry Brn	[illegible]	5.75	370 11.5°C
1709/148	36 gal	"	"	[illegible]	350 11.5°C

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE:

WELL NUMBER (LOCATION): 53 Landfill #3

DATE/TIME: 1/21/87 1604

1.28 WATER LEVEL: 4.1' TOTAL WELL DEPTH: 10.88 WELL VOLUME: 1.119 (For 2" Well, 0.165 gal/foot)

SAMPLE PARAMETER: ADDITIVE:

PROCEDURES/EQUIPMENT:

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)	
1606	—	—	—	—	Top 930 Bottom 950	12°C 13.5°C
1629	3 gal	Clear	—	6.05	950	11.5°C
1645	6 gal	"	—	6.00	930	11.5°C
1700	9 gal	"	—	6.05	925	11.5°C
1715	12 gal	"	—	6.00	923	11.5°C
1735	15 gal	"	—	6.05	900	11.5°C
1750	18 gal	"	—	6.00	900	11.5°C
1805	21 gal	"	—	6.00	900	11.5°C

TOTAL VOLUME:

WELL VOLUMES

COMMENTS:

Sample Taken at 7.5' Below casing

" " at 1805

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB (PHASE II STAGE II)

WELL NUMBER (LOCATION): MW 54

DATE/TIME: 15 JAN 87 / 11:10

WATER LEVEL: 11.95 TOTAL WELL DEPTH: 19.75 WELL VOLUME: 1.29 gal (For 2 " Well, 0.165 gal/foot) 7.80

SAMPLE PARAMETER: HVOC, NHVOC, PET H.C. EXT ADDITIVE: NONE ; @ 4°C

PROCEDURES/EQUIPMENT: REMOVE SUFFICIENT VOLUME FROM WELL FOR PARAMETERS TO STABILIZE. MINIMUM 3 WELL VOLUMES. YSI SCT 33 METER FISHER 107 pH METER, TEFLON BAILER, 4l mixing pyrex flask.

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
11:25	—	—	—	-	SURFACE: 165 @ 15.5°C BOTTOM: 170 @ 16.5°
11:29 / 9	3 GAL	RUST	>100 NTU	4.50	185 @ 15°C
11:34 / 18	6 GAL	"	"	4.05	150 @ 16.5°C
11:40 /	9 GAL	"	>100 NTU	4.30	185 @ 16°
11:46 /	12 GAL	"	"	4.20	140 @ 16°
11:52	15 GAL	"	60% T	4.20	170 @ 16°
11:58	18 GAL	"	"	4.20	100 @ 16°
12:02	21 GAL SEAT	"	"	4.20	90 @ 16°

TOTAL VOLUME: 21 GAL

\# 27.90 WELL VOLUMES

COMMENTS: FIRST BAIL: IN BOTTOM OF CLEAR TEFLON BAILER RUST BROWN GELATENOUS PARTICULATE PRECIPITANT SAMPLE COLLECTED APPARENT STRATIFICATION EXISTS AFTER 6 GAL DARKER RUST COLOR ABOVE A CLEARER HORIZON: ESTIMATED TURBIDITY TOP LAYER 0% T LOWER LAYER 5-10 % T

HVOC [illegible] : A1 (0299) A2 (0298) B1 (0299) B2 (0300)

NON HVOC : C1 (0301) C2 (0302) D1 (0304) D2 (0305)

PET H.C. : E (0306) F (0307)

EXTRACT G1 (0308) G2 (0309) H1 (0310) H2 (0311)

1206	24 GAL	RUST	60% T	4.20	85 @ 16°
1212	27 GAL			4.20	80 @ 16°
1220	30 GAL			4.20	80 @ 16°
1226	33 GAL			4.20	80 @ 16°
1230	36 GAL			4.20	80 @ 16°

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB (2676)

WELL NUMBER (LOCATION): MW 54 (FIRE TRAINING AREA)

DATE/TIME: 23 JAN 87 / 900

WATER LEVEL: 9.45 TOTAL WELL DEPTH: 19.75 (10.30) WELL VOLUME: 1.70 gal (For 2" Well, 0.165 gal/foot)

SAMPLE PARAMETER: INORGANICS ADDITIVE:

PROCEDURES/EQUIPMENT: REMOVE SUFFICIENT WATER VOLUME FROM WELL FOR GIVEN PARAMETERS TO STABILIZE MINIMUM 3 WELL (5.10 gal) VOLUMES. / PERISTALTIC PUMP, YSI 33 SCT METER, FISHER 107 pH meter, 2 (L) pyrex collection flasks, plastic collection container, OVA — NO RESPONSE

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
908					Surface: 440 @ 9.5°C; Bottom: 450 @ 10°C
930	3 GAL	CLEAR	—	5.00	490 @ 7°C
944	6 GAL	"	—	4.95	500 @ 6°C
959	9 Gal	"	—	4.85	429 12.0°C *
1014	12 gal	"	—	4.85	429 12.5
1028	15 gal	"	—	4.90	412 12.5
1049	18 gal	"	—	4.90	490 12.5
1105	21 gal	"	—	4.85	600 13.0
1120	24 gal	"	—	4.75	650 13.0

S.CT meter Not Redlined

TOTAL VOLUME: 42 gal

WELL VOLUMES SAMPLE DEPTH ~14' SAMPLE TIME 1310

COMMENTS: NO FLOATING CONTAMINANT OBSERVED IN DISCHARGE WATER; NO UNUSUAL ODORS NOTED

Winter storm in area 22 JAN 87, 2.5 inches of rain reported in Goldsboro Area within last 24 hr period. — Today: Sunny - clear 25°F

				pH		
1135	27 gal	Clear	—	4.85	435 umhos	13.0°C
1152	30 gal	"	—	4.85	405	13.0°C
1205	33 gal	"		4.55	385	@ 13.0°C
1224	36	"		4.85	390	@ 13.0°C
1238	39			4.75	420	13.0

* meter (S.CT) Redlined at this sample

1255	42		4.85	420	13.0

Chk meter w/ cond. standard 755 umhos @ 19°C 4.85 690 13.0
meter reading 1100 umhos @ 19°C

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB (PLACE II STAGE II)

WELL NUMBER (LOCATION): SW 10 LANDFILL #4

DATE/TIME: 12 JAN 87 / 10:50

WATER LEVEL: — TOTAL WELL DEPTH: — WELL VOLUME: — (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: ~~[illegible]~~ ADDITIVE: NONE ; 4°C

PROCEDURES/EQUIPMENT: OBTAIN SURFACE WATER SAMPLES.

[illegible] SCT METER, FISHER 107 pH METER, 1l collection beaker

Time/Ball No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
		CLEAR	~10 NTU	6.00	190 @ 17°C
~~[illegible]~~	AMBIENT AIR TEMP	→	→	→	9°C
SAMPLE	10:50				

TOTAL VOLUME: ———

——— WELL VOLUMES

COMMENTS: ephemeral drainage stream ; ACROSS Loop (NORTH) AND JUST WEST OF MW 46 ; E AND N of POWER POLES.

DRAINAGE IS FLOWING 1' per 5 sec

DRANE WATER FROM POWER LINE RIGHT-OF-WAY

STAGNATION FILM FLOWING ON SURFACE

CHANNEL FILLED WITH ROTTING VEGETATION

AVERAGE DEPTH ~3"

AVERAGE WIDTH OF STREAM 1 ft

SAMPLE TAKEN [illegible] DOWNGRADIENT N EDGE POWER LINE RIGHT-OF-WAY

SAMPLES COLLECT W/ BEAKER AND DECANTED INTO SAMPLE CONTAINERS.

REASONS FOR COLLECTION AT PARTICULAR SITE:

1. EASE OF REFERENCE
2. UBIQUITOUS CROSS SECTION
3. UNDISTURBED LESS LIKELY TO HAVE BEEN CONTAMINATED BY MECHANICAL EQUIPMENT (ATV, CHAIN SAW, ETC.)

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB (Phase II Stage I)

WELL NUMBER (LOCATION): SW 11 Within ldfill & near MW-14

DATE/TIME: 12 JAN 87 / 10:07

WATER LEVEL: — TOTAL ~~WELL~~ POOL DEPTH: ~3' WELL VOLUME: — (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: Avoc; Hvoc; Pest, Etc ADDITIVE: None, 4°C

PROCEDURES/EQUIPMENT:

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
19:50		Murky Green	>100	5.65	130 umho/cm 6°C

TOTAL VOLUME:

WELL VOLUMES

COMMENTS: Samples taken approximately 1 ft below surface
Samples taken leeward side of impoundment ie North side
With Bottles capped ie (plugged with gloves), Then was lowered
By hand into water plus Removed Bottle filled easy as pie

FEBRUARY/MARCH SAMPLING

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB (26-1-16)

WELL NUMBER (LOCATION): MW 13 (LDF 4)

DATE/TIME: 26 FEB 87 (1:00)

WATER LEVEL: 20-10" TOTAL WELL DEPTH: [illegible] WELL VOLUME: ____ (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: HVOC/AVOC ADDITIVE: @ 4°C

PROCEDURES/EQUIPMENT: Remove sufficient volume of water from well for give parameters to stabilize or minimum of 3 well volumes

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
1:00					420 @ 19°C 445 @ 19.5°C
	3	BLACK	~90	5.80	380 @ 19°C
	12	"	~90	5.40	300 @ 18°C
	21	BL	~50	5.45	290 @ 18°C
	31	"	"	5.35	280 @ 18°C
	41	"	"	5.35	260 @ 18°C
2:30	51	CLEAR		5.35	260 @ 18°C

TOTAL VOLUME: ____

____ WELL VOLUMES

COMMENTS:

AFTER OBTAINING PARAMETER STABILIZATION
REMOVE 3 GALLONS FROM WELL WITHDRAW
SAMPLE DECANT INTO CONTAINERS (40ml vial)
@ 22' / 14:30

SAMPLES: 0587, 0586, 0589, 0590

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB 2676-11

WELL NUMBER (LOCATION): MW-41

DATE/TIME: 2/25/87 1445

WATER LEVEL: 6.3' TOTAL WELL DEPTH: 14.0 WELL VOLUME: 1.27gal (For 2" Well, 0.165 gal/foot)

SAMPLE PARAMETER: organics ADDITIVE: 4°C

PROCEDURES/EQUIPMENT: Bail sufficient volume of water from well for parameters to stabilize or minimum 3 well volumes.

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
					surface 13.0°C 80 umhos
					bottom 13.5°C 65 umhos
1459 9Bail:	2.5 gal.	Milky Brwn	>100 NTU	5.76	13.5°C 100 umhos
1505	5 gal	"	"	5.99	13.0°C 115
1512	7.5	"	"	5.98	13.0°C 120
1518	10.0	"	"	5.98	13.0°C 120
1523	12.5	"	"	5.97	13.0°C 120

TOTAL VOLUME: 12.5 gal

9.84 WELL VOLUMES

COMMENTS:

SAMPLE DEPTH ~ 10 ft

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB

WELL NUMBER (LOCATION): MW 44 (LANDFILL 4)

DATE/TIME: W 25 FEB 87 / 2:30

WATER LEVEL: 4.65 TOTAL WELL DEPTH: 15.0 WELL VOLUME: 1.71 gal (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: ORGANICS ADDITIVE: 4°C

PROCEDURES/EQUIPMENT: BAIL SUFFICIENT VOLUME OF WATER FROM WELL FOR PARAMETER OR 3 WELL VOLUMES minimum

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
2:35				INTEGRATED CONDUCTIVITY	95 @ 10°C
	4 GAL	BRN ORGANIC	100	3.70	90 @ 10.5°C
	8 GAL	BRN ORGANIC	"	3.70	95 @ 10.5°C
	12 GAL	"	"	3.71	90 @ 10.5°C
	16 GAL	"	"	3.72	85 @ 10.5°C
	20 GAL	"	"	3.75	80 @ 10.5°C
	24 GAL	"	"	3.75	80 @ 10.5°C
	28 GAL	"	"	3.74	80 @ 10.5°C

TOTAL VOLUME:

\# 16.37 WELL VOLUMES

COMMENTS:

32 GAL BRN ORGANIC 100 3.75 80 @ 10.5

SAMPLE DEPTH: ~ 8 ft

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB 2676-16

WELL NUMBER (LOCATION): MW-45

DATE/TIME: 2/26/85 1005

WATER LEVEL: 4.3' TOTAL WELL DEPTH: 13.67 WELL VOLUME: ____ (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: AVOC/HVOC A1,A2,B1,B2 ADDITIVE: None 4°C

PROCEDURES/EQUIPMENT: Bail well until pH, Temp, Conduc stabilize min of 3 well Vol.

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
1015				Surface Bottom	12.0°C 50 umhos 14.0°C 65 "
1027	2.5 gal	Gry Blk	>100	5.00	13.0°C 60 "
1038	5.0 gal	"	"	5.16	13.5°C 60 "
1048	7.5 "	"	"	5.16	13.5°C 65 "
1057	10.0 "	"	"	5.16	13.5 65 "
1105	12.5 "	"	"	5.16	13.5 65 "

TOTAL VOLUME: ____

\# ____ WELL VOLUMES

COMMENTS:

SAMPLE TIME 11:00

DEPTH 8'

SAMPLE # (823, 824, 583, 584)

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB (2676-16)

WELL NUMBER (LOCATION): MW 46 (LANDFILL 4)

DATE/TIME: 26 FEB 86 / 10:15

WATER LEVEL: 4.10 TOTAL WELL DEPTH: ____ WELL VOLUME: ____ (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: AVOC / H4or A1-A2 B1-B2 ADDITIVE: @ 4°C

PROCEDURES/EQUIPMENT: Remove sufficient volume of water from well for parameters to stabilize or minimum 3 well volumes

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
10:15					SURFACE 800 @ 7.5°C BOTTOM 575 @ 8.0°C
	4	BRN ORGANIC	~100	6.10	750 @ 7.5°C
	21	STRATIFIED TURBID	~100	5.60	500 @ 10°C
	31	"	~70	5.65	430 @ 10°C
	41	"	~70	5.55	310 @ 10°C
	51	"	~60	5.55	330 @ 10°C
	61	"	~60	5.55	305 @ 10°C
	71	"	~60	5.55	275 @ 10°C

TOTAL VOLUME: ____

____ WELL VOLUMES

COMMENTS:

81 STRAT [illegible] ~60 5.56 280 @ 10°C

AFTER PARAMETER POINTS MAINTAINED REMOVED 3 ADDITIONAL GALLONS FROM WELL WITHDRAW SAMPLE ON LAST BAIL DECANT TO CONTAINERS (12:25)

SAMPLE DRAWN @ 81

#'s 825, 826, 585, 586

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB 2676-16

WELL NUMBER (LOCATION): MW-49 LF4

DATE/TIME: 2/26/87 1130

WATER LEVEL: 4.45 TOTAL WELL DEPTH: ____ WELL VOLUME: ____ (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: AVOC/HVOC ADDITIVE: None 4°C

PROCEDURES/EQUIPMENT: Bail 3 Well Volumes or until Well is Stable

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
1138				Sur. Bott.	9°C 160 umhos 11°C 180 "
1155	22 Bail = 2.5 gal	milky Brn	>100	5.81	10°C 150 "
1207	5.0 gal	"	"	5.89	11°C 130 "
1220	7.5 gal	"	"	5.90	11°C 135 "
1234	10.0 "	"	"	5.90	11°C 125 "
				5.90	11°C 125 "
				5.90	11°C 125 "

TOTAL VOLUME: ____

____ WELL VOLUMES

COMMENTS:

SAMPLE TIME 1234

DEPTH 8.5

SAMPLE #: (0827, 0828, 0587, 0588)

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFI Z676-16

WELL NUMBER (LOCATION): SW 12 / DPDO

DATE/TIME: 26 FEB 86 / 11:30

WATER LEVEL: ____ TOTAL WELL DEPTH: ____ WELL VOLUME: ____ (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: Alkalinity ADDITIVE: 4°C

PROCEDURES/EQUIPMENT: Rinse w/ dI water

Collected directly into bottle

2 Rinses with sample water

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
				5.58	40 @ 8°C
	SAMPLE # 0502				

TOTAL VOLUME: ____

____ WELL VOLUMES

COMMENTS:

Thick algal mat on top of water

Pool Depth 3 inches

Drainage not flowing - 2 or 3 singular pools present

Sample taken at same location as first set

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: [illegible]

WELL NUMBER (LOCATION): SW 13 / DPTO

DATE/TIME: [illegible] / [illegible]

WATER LEVEL: ____ TOTAL WELL DEPTH: ____ WELL VOLUME: ____ (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: HVOC AVOC Alk ADDITIVE: 4°C

PROCEDURES/EQUIPMENT: with clean beaker rinsed w/ sample water collect SAMPLE DECANT INTO 40ml VIALS.

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
				4.40	98 @10°C

SAMPLE # (804 805, 830, 829 (VOCs))

(803 ALKALINITY)

TOTAL VOLUME: ____

____ WELL VOLUMES

COMMENTS:

NOT SAME LOCATION AS PRIOR SAMPLE.

This sample is ~ 7 ft from last sampling point.

Pool of standing water in drainage ditch - most PARTS OF DITCH DRY

Depth of pool 0.35 ft ~4 in

Full of plant detritus [illegible]

LOCATED BY TUPLO POPLAR TREE

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB 2676-16

WELL NUMBER (LOCATION): SW-12

DATE/TIME: 3/2/87 1130

WATER LEVEL: ____ TOTAL WELL DEPTH: ____ WELL VOLUME: ____ (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: M/K ADDITIVE: None 4°C

PROCEDURES/EQUIPMENT: 2 1L Sample Taken via 1L Beaker Washed before sample was Taken Then Flushed 3X with sample water

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
		clear with Green tint	≈ 40 NTU	5.67	11°C 30 umhos
		(Algae) most prob.			

(found entamorpha Green filamentous Algae in water thr. 3/26/87)

TOTAL VOLUME: ____

____ WELL VOLUMES

COMMENTS: Rain & Snow three days ago Lots of standing Water Grnd super Saturated

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB 2676-16

WELL NUMBER (LOCATION): SU-13

DATE/TIME: 3/2/87 1215

WATER LEVEL: ____ TOTAL WELL DEPTH: ____ WELL VOLUME: ____ (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: Alk & VOC ADDITIVE: None 4°C

PROCEDURES/EQUIPMENT: 1L Becker Flushed with Sample water 3 times Then Decant into Sample Bott.

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
1215		Brwn Tnt ≈ 50 ntu	≈ NTU 50	4.24	13°C 50 umhos

TOTAL VOLUME: ____

____ WELL VOLUMES

COMMENTS:

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: STAFB 2676-16

WELL NUMBER (LOCATION): MW-32

DATE/TIME: 3/5/87 1203

WATER LEVEL: 4.0' TOTAL WELL DEPTH: 9.8 WELL VOLUME: ____ (For 2" Well, 0.165 gal/foot)

SAMPLE PARAMETER: AVOC/Hvoc ADDITIVE: None 4°c

PROCEDURES/EQUIPMENT: Bail until pH + Conductivity, Temp stabilize or at least 3 well volumes

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
Surface					10°c 480 umhos
Bottom					10°c 750 "
1217 21 Bail	2.5 gal	Gray Blk	7100ntu	6.03	9.5°c 700 "
1220	5.0 "	"	"	6.26	9.5°c 700 "
1233	7.5 "	"	"	6.29	9.5 700 "
1240	10.0 "	"	"	6.31	9.5 700 "
1249	12.5 "	"	"	6.31	9.5°c 700 "

TOTAL VOLUME: ____

____ WELL VOLUMES

COMMENTS: Sample time 1252

604, 605   076, 075, 073, 074

cdba

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB (2676-16)

WELL NUMBER (LOCATION): MW51 (LANDFILL 3)

DATE/TIME: 5 MARCH 87 / 12:00

52 4/10" WATER LEVEL: 4.18 TOTAL WELL DEPTH: ____ WELL VOLUME: ____ (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: HVOC, AVOC ADDITIVE: 4°C

PROCEDURES/EQUIPMENT: Remove sufficient volume of water from well for parameters to stabilize. (BAILER)

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
	~~3 GAL~~				OFF BOTTOM 300 @ 9°C
	3 GAL	Brown	100	5.66	300 @ 10°C
	12 GAL	"	"	5.60	380 @ 9°C
	21 GAL	"	"	5.5?	400 @ 9°C
	29	"	"	5.56	400 @ 9°C
	35	"	"	5.50	400 @ 9°C
13:00	38 SAMPLE				

TOTAL VOLUME: ____

____ WELL VOLUMES

COMMENTS:

Depth @ 8:

Water above ground surface Fri thru Mon After ~~long~~ periods of heavy precipitation

Water had receeded from wells

(IF 0072, 0070, 0069, $\boxed{0603}$, 0071, $\boxed{0606}$)

extra

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB 2676-11

WELL NUMBER (LOCATION): MW-54 DPDO

DATE/TIME: 1322 3/2/87

WATER LEVEL: 9.2' TOTAL WELL DEPTH: 19.54 WELL VOLUME: ____ (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: Alk, & VOC ADDITIVE: None 4°C

PROCEDURES/EQUIPMENT: Bail At least 3 Well Vol. ~~2ft~~ Until Stabilized

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
Surface					11°c 250 umhos
Bottom					12°c 245 "
1358 9Bails	2.5gal	MilkyBrwn	7100 ATU	4.04	13°c 200 "
1405	5.0 "	"	"	4.55	13°c 210 "
1414	7.5	"	"	4.81	13°c 210 "
1420	10.0	"	"	5.00	12.5°c 210 "
1432	12.5	"	"	5.00	12.5 210 "
1438	15.0	"	"	4.93	12.5 220 "

TOTAL VOLUME: ____

____ WELL VOLUMES

COMMENTS:

1445 17.5 " " 4.91 12.5 215 "

15:00 21.0 " " 12.5 215 "

SAMPLE 15:00
@ 15'

APRIL SAMPLING

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB

WELL NUMBER (LOCATION): MW-12?

DATE/TIME: 14 April 87

WATER LEVEL: 14'6'4" TOTAL WELL DEPTH: 24.27 WELL VOLUME: 1.60 (For 2" Well, 0.165 gal/foot)

SAMPLE PARAMETER: ______ ADDITIVE: ______

PROCEDURES/EQUIPMENT: ______

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
					~~top - 200~~ 95 / bottom - 190
	5 gal			6.10	120 @ 17
	10 gal			6.13	120 @ 15
				6.19	120 @ 15

TOTAL VOLUME: ______

6.2 WELL VOLUMES

COMMENTS: ______

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB

WELL NUMBER (LOCATION): MW-13 (LANDFILL 4)

DATE/TIME: 22 April 87

WATER LEVEL: 19.03 TOTAL WELL DEPTH: 25.17 WELL VOLUME: 1.01 (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: Extract, Anions ADDITIVE: @ 4°C

PROCEDURES/EQUIPMENT: Bail (teflon) until parameters have stabilized (pH, umhos, T).

Time/Bail No.	Cumulative Volumes Gal	Water Color	Turbidity	pH	Conductivity (umhos)
	initial			6.13	1951 @ 19.3
	10			6.01	253 @ 18.9
	20			5.85	283 @ 18.9
	30			5.85	276 @ 18.9

TOTAL VOLUME: 60 gallons

59 WELL VOLUMES

COMMENTS:

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB

WELL NUMBER (LOCATION): MW-14

DATE/TIME: 4/14/87

WATER LEVEL: 12'9½" TOTAL WELL DEPTH: 16.21 WELL VOLUME: 0.56 (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: ______ ADDITIVE: ______

PROCEDURES/EQUIPMENT: ______

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
					top 50/bottom 55
	2 gal (very near dryness)			4.54	50@ 18°
	3 gal			4.60	48@ 16°
	4 gal			4.59	50@ 16
	8 gal			4.59	50 @ 16

TOTAL VOLUME: ______

14 WELL VOLUMES

COMMENTS: Surface water at MW-14
pH : 5.79
cond : 240 µmhos
temp : 17°C

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB

WELL NUMBER (LOCATION): MW 43 LANDFILL 3

DATE/TIME: 14 April 87 / 1030

WATER LEVEL: 4.60 TOTAL WELL DEPTH: 23.96 WELL VOLUME: 1.54 (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: ANIONS, EXTRACT ADDITIVE:

PROCEDURES/EQUIPMENT: TEFLON BAILER

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
	initial			4.92	130 @15
	10 gal			4.95	30 ~~23~~ @ 16.5
	14 gal			4.92	40 @17°
	18 gal			4.97	38 @ 17
	20 gal			4.92	40 @ 17

TOTAL VOLUME:

13 WELL VOLUMES

COMMENTS:

sample @ 18' TOC

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB

WELL NUMBER (LOCATION): MW-44

DATE/TIME: 16 April 1987/12:00

WATER LEVEL: 4.3' TOTAL WELL DEPTH: 15.04 WELL VOLUME: 1.77 (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: extractables/anions ADDITIVE:

PROCEDURES/EQUIPMENT: bailer - teflon

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
				2.97	initial 190@14.8
	40 liters			3.50	146 @13.5
	80 "			3.73	130@13.6
	100 "			3.81	122@13.6
	140 "			3.87	121@13.6
	over 37 gallons				

TOTAL VOLUME:

~21 WELL VOLUMES

COMMENTS: 0687/0686/0684/0685

NO_2, PO_4 NO_3 ext. ext.

sample time 12:00

sample depth 5.5'

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB

WELL NUMBER (LOCATION): MW 45 LANDFILL 4

DATE/TIME: 16 April 87 / 900

WATER LEVEL: 4.40 TOTAL WELL DEPTH: 13.67 WELL VOLUME: 1.53 (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: EXTRAC, ANIONS ADDITIVE: @ 4°C

PROCEDURES/EQUIPMENT: Teflon bailer

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
				5.42	100 @ 15°C
	9 GAL			5.43	70 @ 15°C
	15 GAL			5.43	70 @ 15°C

TOTAL VOLUME: 15 GAL

10 WELL VOLUMES

COMMENTS:

691 690 689 688

Sample depth (5.5')

sample time 10:00

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SUAFB

WELL NUMBER (LOCATION): MW 46 LANDFILL 4

DATE/TIME: 16 April 87 / 1030

WATER LEVEL: 3.75 TOTAL WELL DEPTH: 13.50 WELL VOLUME: 1.61 (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: Extractables, Anions ADDITIVE: @ 4°C

PROCEDURES/EQUIPMENT: Teflon bailer

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
				6.55	600 @ 15°C
	10			6.56	430 @ 15°C
	25			6.58	380 @ 15°C
	34			6.55	355 @ 15°C
	43			6.48	280 @ 15°C
	52			6.41	270 @ 15°C
	61			6.41	260 @ 15°C
	70			6.34	225 @ 15°C

TOTAL VOLUME:

43.5 WELL VOLUMES

COMMENTS:

76 6.34 220 @ 15°C

sample time 1200
sample depth 5.0'

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB

WELL NUMBER (LOCATION): MW-47

DATE/TIME: 16 April/1987/10:00

WATER LEVEL: ~~4.6~~ 4.4' TOTAL WELL DEPTH: 15.07 WELL VOLUME: 10.9 (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: extractables/anion ADDITIVE:

PROCEDURES/EQUIPMENT: teflon bailer

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
				4.70	initial 140 @ 15.6
	40 liters			5.10	144 @ 15.0
	80 liters			5.04	146 @ 15.0

TOTAL VOLUME: 24 Gal

24 WELL VOLUMES

COMMENTS: sample bottle numbers:

extractable E1 = 0696

extractable E2 = 0697

NO_3 = 0698

NO_2 ! PO_4 = 0699

sample time 10:00

sample depth 5.5

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB

WELL NUMBER (LOCATION): MW 48 (LANDFILL 4)

DATE/TIME: 22 April 87 / 9:00

WATER LEVEL: 1.28' TOTAL WELL DEPTH: 24.22 WELL VOLUME: 3.79 (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: Extract Anions ADDITIVE: TOC @ 4°C

PROCEDURES/EQUIPMENT: Teflon, bail until stable (pH, umhos, T°C)

Time/Bail No.	Cumulative Volumes GAL	Water Color	Turbidity	pH	Conductivity (umhos)
	INITIAL			5.62	40 @ 15°C
	9 GAL			5.69	45 @ 17°C
	18 GAL			5.65	45 @ 17°C
	27 GAL			5.65	45 @ 17°C
	33 GAL			5.65	45 @ 17°C

TOTAL VOLUME:

8.72 WELL VOLUMES

COMMENTS:

Sample 6' @ 11:00

700, 701, 702, 703

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB

WELL NUMBER (LOCATION): MW-49

DATE/TIME: 22 April 1987 8:30

WATER LEVEL: 4.45 TOTAL WELL DEPTH: 12.68 WELL VOLUME: 1.34 (For 2 " Well, 0.185 gal/foot)

SAMPLE PARAMETER: ADDITIVE:

PROCEDURES/EQUIPMENT: bailer

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
	initial			5.58	400 @ 13.7
	30 liters			6.09	248 @ 13.6
	50 liters			6.10	214 @ 13.7
	90 liters			6.01	178 @ 13.7
	120 liters			6.04	171 @ 13.6

TOTAL VOLUME: 120 liters ≃ 30 gallons

≈ 22 WELL VOLUMES

COMMENTS: depth 6'

0706 ext.

0707 ext.

0708 NO_3

0770 NO_2, PO_4

sample time 11:07

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB

WELL NUMBER (LOCATION): MW-50

DATE/TIME: 4/14/87 8:30

WATER LEVEL: 2.9 TOTAL WELL DEPTH: 18.77 WELL VOLUME: 2.62 (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: Anions, Extract ADDITIVE:

PROCEDURES/EQUIPMENT: Teflon Bailer

Time/Bail No.	Cumulative Volumes GAL	Water Color	Turbidity	pH	Conductivity (umhos)
				4.22	sfc - 20/bottom - 20
	6 GAL			4.24	15
	12 GAL			4.31	15
	20			4.30	15

TOTAL VOLUME:

7.64 WELL VOLUMES

COMMENTS:

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB

WELL NUMBER (LOCATION): MW 51

DATE/TIME: 15 April 87/10:00

WATER LEVEL: 4.6 TOTAL WELL DEPTH: 9.4 WELL VOLUME: 0.79 (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: ______ ADDITIVE: ______

PROCEDURES/EQUIPMENT: ______

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
					1600 13°
	9 GAL			6.26	1200 13
	18			6.58	600 13
	30			6.56	315 13
	43			6.50	315 13

TOTAL VOLUME: ______

54 WELL VOLUMES

COMMENTS: ______

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB

WELL NUMBER (LOCATION): MW-52

DATE/TIME: 15 April 87

WATER LEVEL: 4.1 TOTAL WELL DEPTH: 9.79 WELL VOLUME: 0.93 (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: EXT. ANIONS ADDITIVE:

PROCEDURES/EQUIPMENT: BAIL (TEFLON) UNTIL PARAMETERS STABILIZE

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
				6.43	1010 @ 13.7
	10			6.51	1094 @ 13.1
	20			6.49	1056 @ 13.2
	30			6.52	1059 @ 13.1

TOTAL VOLUME:

32 WELL VOLUMES

COMMENTS:

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB

WELL NUMBER (LOCATION): MW-53

DATE/TIME: 15 April 87

WATER LEVEL: 4' TOTAL WELL DEPTH: 10.67 WELL VOLUME: 1.08 (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: ______ ADDITIVE: ______

PROCEDURES/EQUIPMENT: ______

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
	initial			6.11	420 @ 14.5
	~~20~~ 24			6.24	400 @ 14.0
	10			6.26	920 @ 14.5

TOTAL VOLUME: ______

9.2 WELL VOLUMES

COMMENTS: ______

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB

WELL NUMBER (LOCATION): MW-54

DATE/TIME: 22 April 87

WATER LEVEL: 10.3 TOTAL WELL DEPTH: 19.54 WELL VOLUME: 1.52 (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER(S) Ext, Anions ADDITIVE(S)

PROCEDURES/EQUIPMENT: BAIL (TEFLON) UNTIL PARAMETERS STABILIZE

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
				4.07	54 @ 13.5
	10			4.77	58 @ 13.5
	20			4.96	55 @ 12.9
	26			5.06	56 @ 13.0
	32			5.09	52 @ 12.8

TOTAL VOLUME: 32

21 WELL VOLUMES

COMMENTS: 0729, 0730, 0731, 0728, 0727

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB

WELL NUMBER (LOCATION): SW 10

DATE/TIME: 14 April 87 / 1600

WATER LEVEL: _____ TOTAL WELL DEPTH: _____ WELL VOLUME: _____ (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: __________ ADDITIVE: __________

PROCEDURES/EQUIPMENT: __________

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
				5.79	240 @ 17°C

TOTAL VOLUME: __________

__________ WELL VOLUMES

COMMENTS: __________

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB

WELL NUMBER (LOCATION): SW 11

DATE/TIME: 14 April 87 / 1700

WATER LEVEL: ____ TOTAL WELL DEPTH: ____ WELL VOLUME: ____ (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: ____________ ADDITIVE: ____________

PROCEDURES/EQUIPMENT: ____________

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
				6.92	420 @ 19°C

TOTAL VOLUME: ____________

____________ WELL VOLUMES

COMMENTS: ____________

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB

WELL NUMBER (LOCATION): SW 13

DATE/TIME: 22 April 1987

WATER LEVEL: ____ TOTAL WELL DEPTH: ____ WELL VOLUME: ____ (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: ____ ADDITIVE: ____

PROCEDURES/EQUIPMENT: ____

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
				4.76	66 @ 21.8°C

TOTAL VOLUME: ____

____ WELL VOLUMES

COMMENTS:

0750

0749

0748

GROUNDWATER SAMPLE WITHDRAW RECORD

PROJECT TITLE: SJAFB

WELL NUMBER (LOCATION): SW 20

DATE/TIME: 22 April 87

WATER LEVLL: ____ TOTAL WELL DEPTH: ____ WELL VOLUME: ____ (For 2 " Well, 0.165 gal/foot)

SAMPLE PARAMETER: ____ ADDITIVE: ____

PROCEDURES/EQUIPMENT: ____

Time/Bail No.	Cumulative Volumes ( )	Water Color	Turbidity	pH	Conductivity (umhos)
				5.88	55 @ 19.2°C

TOTAL VOLUME: ____

____ WELL VOLUMES

COMMENTS: 744
745
746
751

APPENDIX H

CORRESPONDENCE WITH REGULATORY AGENCIES

FILE COPY

RESEARCH TRIANGLE INSTITUTE

Center for Environmental Measurements

November 3, 1986

State of North Carolina
Department of Natural Resources and Community Development
Northeastern Region
P.O. Box 1507
1424 Carolina Avenue
Washington, NC 27889

ATTN: Mr. Willie Hardison
Acting Ground-Water Supervisor

SUBJ: Well Construction Permit No. 95-0131-WM-0108
Seymour Johnson AFB, Goldsboro, NC
RTI Project No. 2676-16

Dear Mr. Hardison:

This transmittal summarizes my telephone conversations with the State this morning regarding our findings of subsurface conditions in the flood plain of Stoney Creek at Seymour Johnson AFB and related monitoring well design considerations. The subsurface conditions encountered to date within pilot holes in the flood plain can be summarized generally as follows:

Approximate Depth Below Land Surface	General Description of Conditions
0 to 10 feet	Medium to coarse, slightly silty tan to brown sands
1 to 2 feet	Water table
10 feet	Several inches of subrounded fine to coarse gravel
10 to 24 feet	Fine to very fine, black to dark gray sands with silty clay laminations (Assumed top of Black Creek Formation)
24 to 34 feet	Laminated dark gray to black silty clays and sands
34 to 74 feet	Dense, dark gray silty clay

(Note: Deep pilot hole terminated at 74.5 feet, still within dense dark gray silty clay unit, and grouted back to land surface.)

Post Office Box 12194 Research Triangle Park, North Carolina 27709 Telephone: 919 541-6000

It is our opinion, based only upon observations of the lithologic samples collected thus far, that the surficial aquifer in the flood plain of Stoney Creek may be composed of two transmissive zones (one from ground surface to approximately 10 feet and the second below 10 feet to approximately 24 feet). Of these two zones, we are currently assuming that the lower zone is less transmissive of potential contaminants because of its stratification with silty clays. Although this condition may change in other locations of the flood plain, we believe, at this time, that the best procedures to follow for well installation would be as follows:

1. to install one set of nested wells in an area immediately downgradient of one of the landfills that borders Stoney Creek (Landfill No. 4). One of the nested wells would be set only in the upper sand zone (from approximately 1 to 10 feet). The second adjacent well would only be open to the lower zone (from approximately 12 to 24 feet) and the upper sand zone would be sealed off in this second well.

2. to install remaining downgradient wells in upper sand zone only; recognizing that in a later stage of investigation (depending on the results of this study) it may be desirable to consider installing additional wells in the lower sand zone.

3. to install the wells in the upper sand zone so that the screen will be above the present shallow water table (as detailed in the attached diagram).

4. to forego the installation of any monitoring wells within the flood plain with long (20 foot) well screens to avoid the possible effects of dilution on water quality results.

5. to forego the installation of any deep wells beneath the dense silty clay stratum at this time. On the basis of the thickness and lithology of this clay stratum, it is presently felt that such a deep monitoring well would be unnecessary as most of the measurable effects of the landfill will be observed in the surficial aquifer. It is anticipated that any productive water bearing sands that exist beneath this clay stratum principally receive recharge from remote areas relative to the sites under investigation.

It is my understanding from talking with Mr. Laymon that a variance for our monitoring well permit is not required in this instance, and that this transmittal is primarily provided to document what I described to you by telephone today. As you are aware, we are actively involved in the drilling operation at Seymour Johnson AFB at this time. Should you have any questions or comments about this transmittal, we would be happy to resolve any issues by telephone in order to avoid delays in the field program.

Thank you for your consideration in this matter.

Sincerely,

W. Joseph Alexander

W. Joseph Alexander
Project Leader

/bsb

Enclosure

cc: Cpt. McCarty
Cpt. Warren- copy of let to Mulligan asking for Permit included

SJAFB
RTI 2676-16

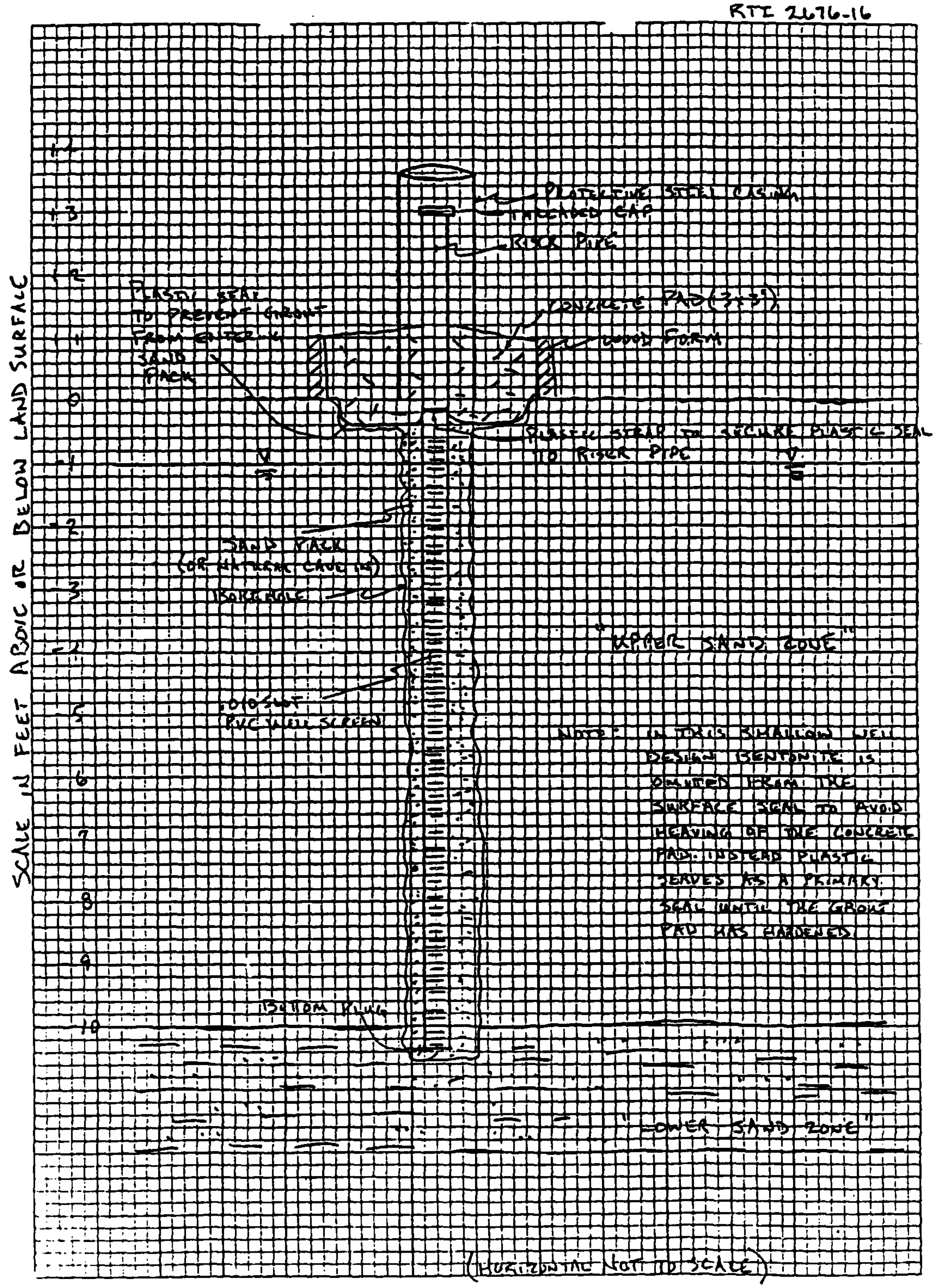


DIAGRAM OF SHALLOW WELL DESIGN

FILE COPY

RESEARCH TRIANGLE INSTITUTE

Center for Environmental Measurements

October 20, 1986

TO WHOM IT MAY CONCERN:

SUBJ: RTI Project No. 432U-2676-16
USAF Contract No. F33615-83-D-4010

Mr. Scott A. Guthrie is employed by the Research Triangle Institute and is currently working on an environmental study related to groundwater at Seymour Johnson Air Force Base in Goldsboro, NC. As such, he is collecting data about wells and water use in the area surrounding Seymour Johnson Air Force Base in order to help us understand more about the ground-water flow system in this area. Data obtained under this request will only be used for this specific evaluation purpose.

As Mr. Guthrie's Supervisor, and as Project Leader for this study for the U.S. Air Force, I would be happy to answer any questions you may have regarding this project and our specific requests for data. Thank you for your cooperation.

Sincerely,

W. Joseph Alexander

W. Joseph Alexander
Project Leader
Manager, Hydrogeology Dept.
(919) 541-7025

/bsb

cc: Capt. Steve Warren
Seymour Johnson Air Force Base
(919) 736-5556

Post Office Box 12194 Research Triangle Park, North Carolina 27709 Telephone: 919 541-6000

FILE COPY

State of North Carolina
Department of Natural Resources and Community Development
Northeastern Region
1424 Carolina Avenue, Washington, North Carolina 27889

James G. Martin, Governor
S. Thomas Rhodes, Secretary

DIVISION OF ENVIRONMENTAL MANAGEMENT

Lorraine G. Shinn
Regional Manager

September 18, 1986

Captain Steve Warren
U.S.A.F. Hospital/SGPB
Seymour Johnson Air Force Base
Goldsboro, North Carolina 27531-5300

SUBJECT: Well Construction Permit No.
95-0131-WM-0108

Dear Captain Warren:

In accordance with your application received September 15, 1986, we are forwarding herewith Well Construction Permit No. 95-0131-WM-0108 dated September 18, 1986, issued to Seymour Johnson Air Force Base, for the construction of 15 monitoring wells located at Seymour Johnson Air Force Base, in Wayne County.

This Permit will be effective from the date of its issuance until March 18,1987, and shall be subject to the conditions and limitations as specified therein.

If any parts, requirements, or limitations contained in this Permit are unacceptable to you, you have the right to an adjudicatory hearing before a hearing officer upon written demand to the Director within 30 days following receipt of this Permit, identifying the specific issues to be contended. Unless such demand is made, this Permit shall be final and binding.

Sincerely,

Jim Mulligan

Jim Mulligan
Regional Supervisor

Enclosure

cc: W. J. Alexander ✓
Bob Cheek
Files

RECEIVED
SEP 23 1986
HYDROGEOLOGY DEPARTMENT

PO Box 1507, Washington, North Carolina 27889-1507 Telephone 919-946-6481

NORTH CAROLINA
ENVIRONMENTAL MANAGEMENT COMMISSION
DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT

PERMIT FOR THE CONSTRUCTION OF A WELL OR WELL SYSTEM

In accordance with the provisions of Article 7, Chapter 87, North Carolina Statutes, and other applicable Laws, Rules and Regulations,

PERMISSION IS HEREBY GRANTED TO

SEYMOUR JOHNSON AIR FORCE BASE

FOR THE CONSTRUCTION OF A MONITOR WELL/WELL SYSTEM located at Seymour Johnson Air Force Base, Goldsboro, North Carolina, in Wayne County, in accordance with the application dated September 12, 1986, and in conformity with specifications and supporting data, all of which are filed with the Department of Natural Resources and Community Development and are considered a part of this Permit.

This Permit is for well construction only, and does not waive any provision or requirement of any other applicable law or regulation.

Construction of a well under this Permit shall be in compliance with the North Carolina Well Construction Regulations and Standards, and any other State and local laws and regulations pertaining to well construction.

This Permit will be effective from the date of its issuance until March 18, 1987, or as this date shall be amended and shall be subject to other specified conditions, limitations, or exceptions as follows:

1. The borehole shall not be drilled below the bottom of the unconfined aquifer unless a well is to be completed at a greater depth. If monitoring of both the confined and unconfined aquifers is desired, two separate wells shall be constructed.

2. The construction materials shall be compatible with the type of waste being monitored. Thermoplastic casing with threaded couplings where the threads form an integral part of the casing shall meet or exceed all the specifications for water well casing as classified by the American Society for Testing and Material (ASTM).

3. Well standards require that wells be grouted only from land surface to a depth of twenty feet, except when zones or strata containing mineralized or polluted water are encountered. Monitor wells shall be grouted from land surface to a point near the top of the interval being monitored in order to insure that the sample is representative of the zone being monitored.

   When it is desirable to monitor zones occurring at depths of less than 20 feet, the well shall be grouted from land surface to within two feet of the top of the screen in screened wells and to the bottom of the casing in open-end wells. The top of the screen shall not be above the mean high seasonal water level.

4. The casing shall be installed with centering guides to provide for proper "gravel" envelope.

5. The "gravel pack" shall be placed around the screened wells and extended approximately one feet above the well screen.

6. In "gravel" packed wells, a one-foot clay seal shall be placed on top of the "gravel" envelope.

7. The well shall be grouted from land surface to the top of the clay seal.

8. All identification and completion requirements of the well standards shall apply. The entrance to the well shall be secured with a lock.

9. The well shall be permanently labeled with a warning that it is for monitoring only and not to be used for water supply purposes. The location of the warning and size of the lettering shall be eye catching.

10. All data including well construction reports (GW-1), water levels, water analysis, and other types of logs for each constructed well shall be submitted to the Department.

11. When a monitor well is no longer useful for its intended purpose or its use is discontinued, it shall be properly abandoned and an abandonment report filed.

12. The Washington Regional Office shall be notified 24 hours prior to construction of the monitor well.

13. The well owner shall notify the Washington Regional Office upon completion of the monitor well.

14. Prior to the construction of the monitor well, the well location shall be approved by the Department.

Permit issued this the 18th day of September, 1986.

NORTH CAROLINA ENVIRONMENTAL MANAGEMENT COMMISSION

Jim Mulligan

Jim Mulligan, Regional Supervisor
Division of Environmental Management
By Authority of the
Environmental Management Commission

PERMIT NO. 95-0131-WM-0108

Aquifer System: Surficial

FILE COPY

RESEARCH TRIANGLE INSTITUTE

Center for Environmental Measurements

September 12, 1986

Washington Regional Office
North Carolina Department of Natural Resources
and Community Development
P.O. Box 1129
Washington, NC 27889

ATTN: Mr. Jim Mulligan
Regional Manager

SUBJ: Request for Monitoring Well Construction Permits
RTI Project No. 432U-2676-16

Dear Mr. Mulligan:

As you may recall from our March 26, 1986 meeting at Seymour Johnson Air Force Base, the Research Triangle Institute (RTI) is serving as the contractor for the Air Force in conducting the Phase II, Stage 2 investigation on the base. The purpose of this investigation was described in detail by the Air Force, and the sites for investigation were visited during our meeting. As a part of this investigation, RTI will oversee the installation of 14 shallow (< 30 feet) monitoring wells within the surficial aquifer and one deep (< 100 feet) monitoring well in the uppermost productive zone of the Black Creek aquifer system. The actual location and depth of the wells will have to be determined on the basis of conditions encountered in the field.

The basic well construction requirements specified by the Air Force are indicated in Figure 1. In addition, RTI will comply with well construction standards indicated in .0108, (c) of the N.C. Administrative Code, Title 15, Subchapter 2C, Well Construction Standards, September 1, 1984.

RTI requests the issuance of monitoring well construction permits for this project, and needs to begin construction of the wells near the end of this month in order to meet our project schedule. Upon completion of the monitoring wells, RTI will provide the Air Force with well construction reports and related information required by the Environmental Management Commission.

Thank you for your consideration. I would be happy to answer any questions you might have regarding the proposed wells.

Sincerely,

W. Joseph Alexander
Project Leader

/bsb

cc: Capt. Brian McCarty
USAF, OEHL
Brooks Air Force Base, TX

Post Office Box 12194 Research Triangle Park, North Carolina 27709 Telephone: 919 541-6000

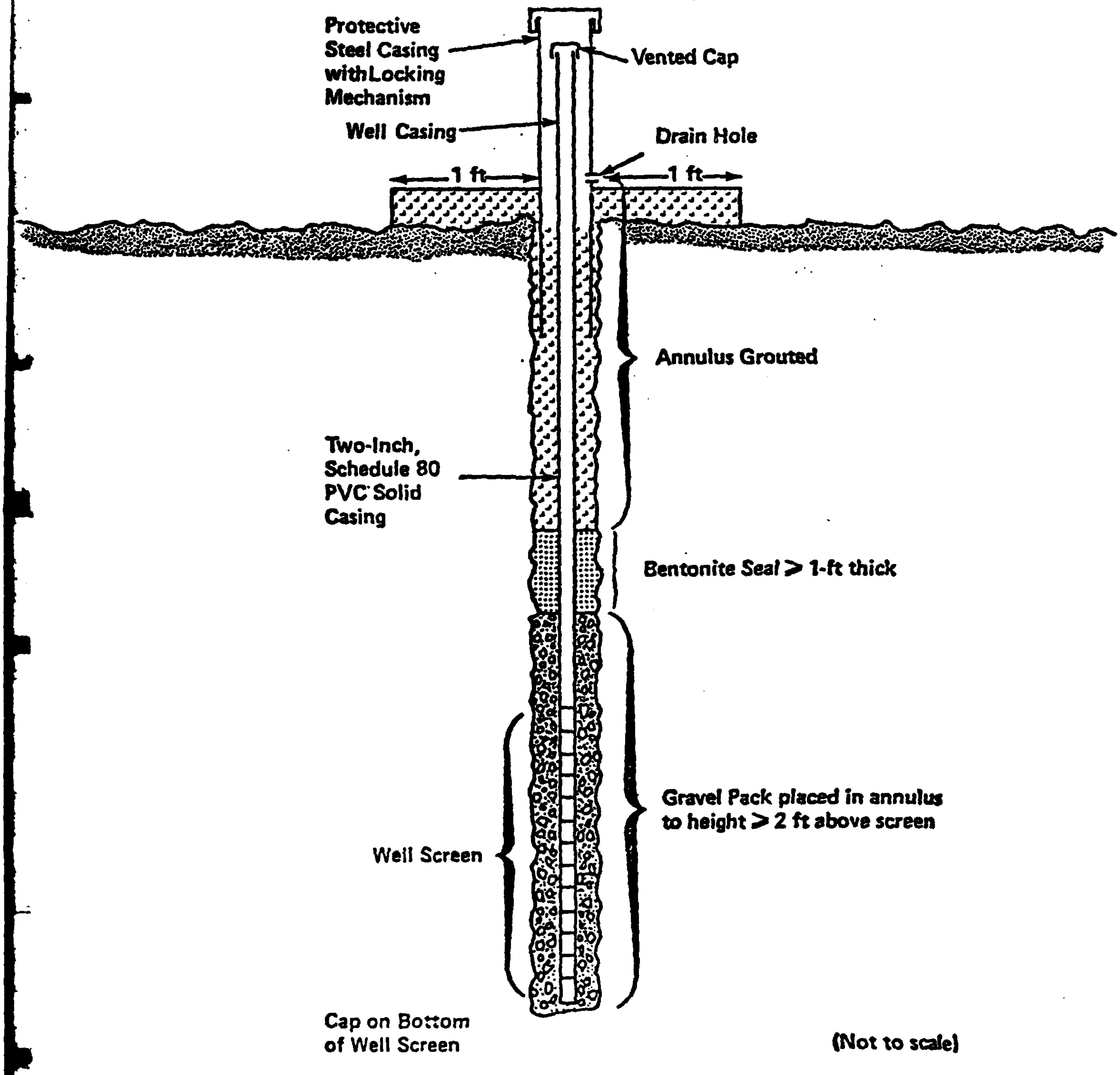


FIGURE 1: Typical single-screened interval well

NORTH CAROLINA ADMINISTRATIVE CODE

TITLE 15

DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT

ENVIRONMENTAL MANAGEMENT

SUBCHAPTER 2C .0100

WELL CONSTRUCTION STANDARDS

CRITERIA AND STANDARDS APPLICABLE TO WATER SUPPLY AND CERTAIN OTHER TYPE WELLS

EFFECTIVE MARCH 1, 1985

AS APPROVED BY THE ATTORNEY GENERAL

ENVIRONMENTAL MANAGEMENT COMMISSION

RALEIGH, NORTH CAROLINA

History Note: Statutory Authority G.S. 87-87; 87-88;
Eff. February 1, 1976;
Amended Eff. September 1, 1984; April 20, 1978.

.0114 DATA AND RECORDS REQUIRED

(a) Well Cuttings

(1) Samples of formation cuttings shall be collected and furnished to the department from all wells when such samples are requested by the department.

(2) Samples or representatives cuttings shall be obtained for depth intervals of 10 feet or less beginning at the land surface. Representative cuttings shall also be collected at depths of each significant change in formation.

(3) Samples of cuttings shall be placed in containers furnished by the department and such containers shall be filled, sealed and properly labeled with indelible-type markers, showing the well owner, well number if applicable, and depth interval the sample represents.

(4) Each set of samples shall be placed in a suitable container(s) showing the location, owner, well number if applicable, driller, depth interval, and date.

(5) Samples shall be retained by the driller until delivery instructions are received from the department or for a period of at least 60 days after the well record form (GW-1), indicating said samples are available, has been received by the department.

(6) The furnishing of samples to any person or agency other than the department shall not constitute compliance with the department's request and shall not relieve the driller of his obligation to the department.

(b) Reports

(1) Any person completing or abandoning any well shall submit a record of the construction or abandonment on forms provided by the department. The record shall include certification that construction or abandonment was completed as required by these Regulations, the owner's name and address, well location, diameter, depth, yield, and any other information the department may reasonably require.

(2) The certified record of completion or abandonment shall be submitted to the department within a period of thirty days after completion or abandonment.

History Note: Statutory Authority G.S. 87-87; 87-88;
Eff. February 1, 1976;
Amended Eff. September 1, 1984; April 20, 1978.

.0112 WELL MAINTENANCE: REPAIR: GROUNDWATER RESOURCES 18.52
(a) Every well shall be maintained in a condition whereby it 18.54
will conserve and protect the ground water resources, and whereby 18.55
it will not be a source or channel of contamination or pollution 18.56
to the water supply or any aquifer. 18.57
(b) All materials used in the maintenance, replacement, or 19.2
repair of any well shall meet the requirements for new 19.3
installation.
(c) Broken, punctured or otherwise defective or unserviceable 19.5
casing, screens, fixtures, seals, or any part of the well head 19.6
shall be repaired or replaced, or the well shall be properly 19.7
abandoned.
(d) National Science Foundation (NSF) approved PVC pipe rated 19.10
at 160 PSI may be used for liner casing. The annular space 19.11
around the liner casing shall be at least five-eighths inches and 19.12
shall be completely filled with neat-cement grout.

History Note: Statutory Authority G.S. 87-87; 87-88; 19.16
Eff. February 1, 1976; 19.17
Amended Eff. September 1, 1984. 19.18

.0113 ABANDONMENT OF WELLS 19.20
(a) Any well which has been abandoned, either temporarily or 19.23
permanently, shall be abandoned in accordance with one of the
following procedures:
(1) Procedures for temporary abandonment of wells: 19.25
(A) Upon temporary removal from service or prior to 19.27
being put into service, the well shall be sealed 19.28
with a water-tight cap or seal compatible with
casing and installed so that it cannot be removed 19.29
easily by hand.
(B) The well shall be maintained whereby it is not a 19.30
source or channel or contamination during 19.31
temporary abandonment.
(C) Every temporarily abandoned well shall be 19.32
protected with a casing. 19.33
(2) Procedures for permanent abandonment of wells: 19.35
(A) All casing and screen materials may be removed 19.37
prior to initiation of abandonment procedures if 19.38
such removal will not cause or contribute to
contamination of the groundwaters. Any casing not 19.39
grouted in accordance with Rule .0107 Paragraph
(d) of this Section shall be removed or properly
grouted. 19.40
(B) The entire depth of the well shall be sounded 19.41
before it is sealed to ensure freedom from 19.42

obstructions that may interfere with sealing 19.43
operations.
(C) The well shall be thoroughly disinfected prior to 19.45
sealing.
(D) In the case of gravel-packed wells in which the 19.46
casing and screens have not been removed, neat- 19.47
cement shall be injected into the well completely
filling it from the bottom of the casing to the 19.48
top.
(E) "Bored" wells shall be completely filled with 19.49
cement grout, dry clay or material excavated 19.50
during drilling of the well and then compacted in
place.
(F) Wells constructed in unconsolidated formations 19.51
other than "bored" wells shall be completely 19.52
dilled with cement grout by introducing it through
a pipe extending to the bottom of the well which 19.53
can be raised as the well is filled.
(G) Wells constructed in consolidated rock formations 19.54
or that penetrate zones of consolidated rock may 19.55
be filled with cement, sand, gravel or drill
cuttings opposite the zones of consolidated rock. 19.56
The top of the sand, gravel or cutting fill shall
be at least five feet below the top of the
consolidated rock. The remainder of the well 19.[illegible]
shall be filled with cement grout only.
(H) Test wells less than 20 feet in depth which do not 20.2
penetrate the water table shall be abandoned in
such manner as to prevent the well from being a
channel allowing the vertical movement of water or 20.3
a source of contamination to the groundwater
supply. Test wells or borings that penetrate the 20.4
water table shall be abandoned by completely
filling with cement grout.

(b) Any well which acts as a source or channel of 20.6
contamination shall be repaired or permanently abandoned within 20.7
30 days or receipt of notice from the department.

(c) The drilling contractor shall permanently abandon any well 20.8
in which the casing has not been installed or from which the 20.9
casing has been removed, prior to removing his equipment from the
site. 20.10

(d) The owner shall be responsible for permanent abandonment 20.12
of a well except:
(1) As otherwise specified in these Regulations; or 20.14
(2) If well abandonment is required because the driller 20.17
improperly locates, constructs, or completes the well.

APPENDIX I

CHAIN-OF-CUSTODY RECORDS

SECTION I-1

OCTOBER/NOVEMBER SAMPLING

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

page 1 of 2

Shipment to: Environmental Chem. Dept. R.T.I.

Method of Shipment:
All Project Name: SJAFB PH II S1
All Project Number: 2676-16
Contract Number:

Note: Please return completed form to: Hydrogeology Dept. Att: Steve Winters
R.T.I.
P.O. Box 12194
Res. Tri. Pk, NC 27709

Sticker No.	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses	Remarks
0038	SB-57, 2-4' D	DPDO	soil	low-med.	S. Winters S. Guthrie	13 NOV 86 09:15	polypropylene bag w/ 1/2 pt. w.m. glass [illegible]	4°C	X X X X X	
0042	SB-57, 4-6' D	→	→	→	→	13 NOV 86 09:30	→	→	X X X X X	
0046	SB-57, 9-11' D	→	→	→	→	13 NOV 86 09:45	"	→	X X X X X	
0050	SB-57, 11-13' D	→	→	→	→	13 NOV 86 10:00	→	→	X X X X X	small sample quantity
0054	SB-55, 1-3' D	→	→	→	→	13 NOV 86 11:30	→	→	X X X X X	
0058	SB-55, 3-5' D	→	→	→	→	13 NOV 86 11:45	→	→	X X X X X	
0062	SB-55, 9-11' D	→	→	→	→	13 NOV 86 12:10	→	→	X X X X X	
0066	SB-55, 11-13' D	→	→	→	→	13 NOV 86 12:20	→	→	X X X X X	
0068	SB-55, 13-15' D	↓	↓	↓	↓	13 NOV 86 12:40	↓	↓	X X X X X	[illegible] SB-57 [illegible]

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters	B. Wilson		13 NOV 86	

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

Page 2 of 2

Method of Shipment:
RTI Project Name: SJAFB PRES I
RTI Project Number: 2676-1b
Contract Number:

Note: Please return completed form to: Hydrogeology Dept. Att: Steve Winters
R.T.I.
P.O. Box 12194
RES. Tri. Pk., NC 27701

Sticker No.	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses	Remarks
0022	SB-56 0-2' D	DPDO	soil	low-med.	S. Winters, S. Guthrie	12 NOV 86 06:55	polyethylene bag w/in the pt. with glass mason jar	4°C	X X X X, X	
0026	SB-56, 3-5' D	↓	↓	↓	↓	12 NOV 86 09:13	↓	↓	X X X X, X	
0030	SB-56, 8-10' D	↓	↓	↓	↓	12 NOV 86 09:25	"	↓	X X X X, X	
0031	SB-56, 13-15' D	↓	↓	↓	↓	12 NOV 86 09:40	↓	↓	X X X X, X	
0079	SB-56, 15-18' D	↓	↓	↓	↓	12 NOV 86 09:40	↓	↓	X	TP for 5200

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters	B. Wilson		13 NOV 86	

I-4

RTI Total Metal Screens

Shipment to: RTI

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

page 1 of 1

Method of Shipment: RTI Van
RTI Project Name: SJAFB (B,2)
Contract Number: F33615-D-4040
RTI Project Number: 4980-2676-16

Note: Please return completed form to: RTI Hydrogeology Department Att: Steve Winters

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (L,M,H)	Sampler(s)	Date/Time	Container type/vol.	Preservation	Analyses	Remarks
0001	SB-60,1-2.5'A	Coal Pile	soil	L-M	SW/SA	14 Oct. 86 11:00	½ pt. WM. G. and P. bag	~4°C	X	
0003	SB-60,3.5-5'A	Coal Pile	soil	L-M	SW/SG	14 Oct. 86 11:15	½ pt. WM. G and P bag	~4°C	X	
0005	SB-60,8.5-10'A	Coal Pile	soil	L-M	SW/SG	14 Oct. 86 11:45	½ pt. WM. G and P bag	~4°C	X	
0007	SB-58,1-2.5'A	Coal Pile	soil	M-H	SW/SG	14 Oct. 86 14:10	½ pt. WM. G and P bag	~4°C	X	
0009	SB-58,3.5-5'A	Coal Pile	soil	M-H	SW/SG	14 Oct. 86 14:25	½ pt. WM. G and P bag	~4°C	X	
0011	SB-58,8.5-10'A	Coal Pile	soil	M-H	SW/SG	14 Oct. 86 14:40	½ pt. WM. G and P bag	~4°C	X	
0013	SB-59,1-2.5'A	Coal Pile	soil	M-H	SW/SG	14 Oct. 86 15:18	½ pt. WM. G and P bag	~4°C	X	
0015	SB-59,3.5-5'A	Coal Pile	soil	M-H	SW/SG	14 Oct. 86 15:23	½ pt. WMG and P bag	~4°C	X	
0017	SB-59,8.5-10'A	Coal Pile	soil	M-H	SW/SG	14 Oct. 86 15:45	½ pt. WMG and P bag	~4°C	X	

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters (SW)	Ben Wilson		10/29/86	

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

page 2 of 2

Shipment to: IEA

Method of Shipment:
RTI Project Name: SJAFB PH#31
RTI Project Number: 2676-16
Contract Number:

Note: Please return completed form to: Hydrogeology Dept. Att: Steve Winters
R.T.I.
P.O. Box 12194
Res. Tri. Pk., NC 27709

Sticker No.	Sample ID	Sampling Location	Sample Media	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Remarks
0020	SB-56, 0-2' B	DPDO	soil	low-med.	S. Winters S. Gotthardt	12 Nov 86 08:55	4"x1 1/2" brass tube, plastic cap w/ Al liner	4°C	
0024	SB-56, 3-5' B	↓	↓	↓	↓	12 Nov 86 09:13	↓	↓	
0028	SB-56, 8-10' B	↓	↓	↓	↓	12 Nov 86 09:26	"	↓	
0032	SB-56, 13-15' B	↓	↓	↓	↓	12 Nov 86 09:40	↓	↓	
0067	SB-56, 16-18' B	↓	↓	↓	↓	12 Nov 86 10:00	↓	↓	

Analyses

Sticker No.	E418.1 (Pet.HC, water)	SW3550/E418.1 (Pet.HC, soil)	SW5030/SW8020 (A.V.O.C., water)	SW5030/SW8020 (A.V.O.C., soil)	E601 (H.V.O.C., water)	SW5030/SW8010 (H.V.O.C., soil)	E239.2 (Lead)	E200.7 (13 P.P.Met., water)	E206.2	E245.1	E270.2	SW3050/SW7060 (13 P.P.Met., soil)	SW3050/SW6010	SW7471	SW3050/SW7740	E625 (Extract, water)	SW3550/SW8270 (Extract, soil)	E160.1 (T.D.S.)	[illegible] (Anions)	[illegible] (Tot.CN, water/soil)	[illegible] (TTK.)	SW5030/SW8010 (Tot.O.J., soil)	SW5030/SW8015 (Hazem.T.O.C., water/soil)	SW1310 (EP Tox., soil)				
0020		X		X		X											X						X					
0024		X		X		X											X						X					
0028		X		X		X											X						X					
0032		X		X		X											X						X					
0067		X		X		X											X						X					

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
[signature] 17 Nov 86	Ronald Brown 11-17-86			

I-6

Shipment to: IEA Laboratories
Res. Tri. Pk., NC

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

page 1 of 2

Method of Shipment: SUAEB PRESS
RTI Project Name:
RTI Project Number: 2676-16
Contract Number:

Note: Please return completed form to: Hydrogeology Department
R.T.I.
P.O. BOX 12194, Res. Tri. Pk, NC 27709 Att: Steve Winters

Sticker No.	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	E418.1 (Pet. HC, water)	SW3550/E418.1 (Pet. HC, soil)	SW5030/SW8020 (A.V.O.C., water)	SW5030/SW8020 (A.V.O.C., soil)	E601 (H.V.O.C., water)	SW5030/SW8010 (H.V.O.C., soil)	E239.2 (Lead)	E200.7 (13 P.P. Met., water)	E206.2 (13 P.P. Met., water)	E213.1 (13 P.P. Met., water)	E270.2 (13 P.P. Met., water)	SW3050/SW7060 (13 P.P. Met., soil)	SW3050/SW6010 (13 P.P. Met., soil)	SW7471 (13 P.P. Met., soil)	SW3050/SW7740 (13 P.P. Met., soil)	E625 (Extract, water)	SW3550/SW8270 (Extract, soil)	E160.1 (T.D.S.)	A429 (Anions)	A412D (Tot. CN, water/soil)	A403 (Alk.)	SW3050/SW6010 (Tot. M.S., soil)	SW5030/SW8015 (Non-H.V.O.C., water/soil)	SW1310 (EPA Tox., soil)					Remarks
0035	SB-57, 0-2' B	DPDO	soil	low-mod.	S. Winters S. Guthrie	13 NOV 86 09:10	4"-1¾" brass tube, plastic cap w/ Al liner	4°C		X		X		X											X						X						partially full tube; no A replicate
0036	SB-57, 2-4' B					13 NOV 86 09:10				X		X		X											X						X						No A replicate
0040	SB-57, 4-6' B					13 NOV 86 09:10	"			X		X		X											X						X						
0044	SB-57, 9-11' B					13 NOV 86 09:45				X		X		X											X						X						
0048	SB-57, 11-13' B					13 NOV 86 10:00				X		X		X											X						X						sample water saturated
0052	SB-55, 1-3' B					13 NOV 86 11:30				X		X		X											X						X						
0056	SB-55, 3-5' B					13 NOV 86 11:45				X		X		X											X						X						
0060	SB-55, 9-11' B					13 NOV 86 12:10				X		X		X											X						X						
0064	SB-55, 11-13' B					13 NOV 86 12:20				X		X		X											X						X						soil water saturated

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
[signature] 17 NOV 86	Ronald Braun 11-17-86			

SECTION I-2

JANUARY SAMPLING

CHAIN OF CUSTODY

Shipment to:

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

page 1 of 6

Method of Shipment:
RTI Project Name: SJAFB
Contract Number:

RTI Project Number: 432U-2676-16

Note: Please return completed form to: Steve Winters
Hydrogeology Dept. Bld 7, Rm 110
R.T.I.

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Remarks
✓ 0080	MW-40, 15' A1	Fire Train. Area 3	Water	L	SW	7 Jan. 87 09:00	40 mL (G)	4°C	
✓ 0081	MW-40, 15' A2	↓	↓	↓	↓	↓	↓	↓	
✓ 0091	MW-40, 15' C	↓				↓	1L (G)		
✓ 0093	MW-43, 21' A1	Landfill 4				7 Jan. 87 11:00	40 mL (G)		
✓ 0094	MW-43, 21' A2	↓				↓	↓		
✓ 0097	MW-43, 21' C						1L (G)		
✓ 0103	MW-43, 21' E1								
✓ 0104	MW-43, 21' E2	↓	↓	↓	↓	↓	↓	↓	

Analyses

Sticker	E418.1 (Pet. HC, water)	SW3550/E418.1 (Pet. HC, soil)	SW5030/SW8020 (A.V.O.C., water)	SW5030/SW8020 (A.V.O.C., soil)	E601 (H.V.O.C., water)	SW5030/SW8010 (H.V.O.C., soil)	E239.2 (Lead)	E200.7 (13 P.P. Met., water)	E206.2	E270.2	E279.2	SW3050/SW7060 (13 P.P. Met., soil)	SW3050/SW6010	SW7471	SW3050/SW7740	E625 (Extract., water)	SW3550/SW8270 (Extract., soil)	E160.1 (T.D.S.)	A429 (Anions)	A412D (Tot. CN, water/soil)	A405 (TKN)	SW3050/SW9010 (Tot. H.S., soil)	SW5030/SW8015 (Non-H.V.O.C., water/soil)	SW1310 (EP Tox., soil)
0080			X		X																			
0081			X		X																			
0091	X																							
0093			X		X																			
0094			X		X																			
0097	X																							
0103																X								
0104																X								

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters	Stewart Scott	09:15 GOOD	9 Jan '87 / 09:15	Note 2 wk hold time on VOC

I-9

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

page 2 of 6

Shipment to:

Method of Shipment:
RTI Project Name: 3 JAFB
Contract Number:
RTI Project Number: 4324-2676-16

Note: Please return completed form to: Steve Winters
Hydrogeology Dept., Bld 7, Rm 110
R.T.I.

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses	Remarks
0107	MW-50, 16' A1	Landfill 3	water	L	SW	7 Ja 87 14:30	40 mL (G)	4°C	X X	
0108	MW-50, 16' A2								X X	
0111	MW-50, 16' C						1 L (G)		X	
0113	MW-50, 16' E1								X	
0114	MW-50, 16' E2								X	
0117	MW-11, 20' A1	Fire Trng. Area 3		L to M		7 Ja 87 16:00	40 mL (G)		X X	
0118	MW-11, 20' A2								X X	
0121	MW-11, 20' C						1 L (G)		X	

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters	Stewart Scott	GOOD	9 Ja 87/09:15	Hb 24 hold time on VOCs

page 3 of 6

CHAIN OF CUSTODY

Shipment to:

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

Method of Shipment:
RTI Project Name: SJAFB
Contract Number:

RTI Project Number: 432U-2676-16

Note: Please return completed form to: Steve Winters
Hydrogeology Dept., Bld. 7, Rm. 110
R. T. I.

Sticker No.	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Remarks
0123	MW-41, 12½' A1	Fire Trn. Area 3	Water	L&M	SW	7 Jan 87 17:15	40 mL (G)	4°C	
0124	MW-41, 12½' A2	↓	↓	↓	↓	↓	↓	↓	
0127	MW-41, 12½' C	↓	↓	↓	↓	↓	1 L (G)	↓	
0129	MW-42, 13' A1	↓	↓	↓	↓	8 Jan 87 09:00	40 mL (G)	↓	
0130	MW-42, 13' A2	↓	↓	↓	↓	↓	↓	↓	
0133	MW-42, 13' C	↓	↓	↓	↓	↓	1 L (G)	↓	
0135	MW-12, 20½' A1	Landfill 1	↓	↓	↓	8 Jan 87 11:00	40 mL (G)	↓	
0136	MW-12, 20½' A2	↓	↓	↓	↓	↓	↓	↓	

Analyses

Sticker No.	E418.1 (Pet. HC, water)	SW3550/E418.1 (Pet. HC, soil)	SW5030/SW8020 (A.V.O.C., water)	SW5030/SW8020 (A.V.O.C., soil)	E601 (H.V.O.C., water)	SW5030/SW8010 (H.V.O.C., soil)	E239.2 (Lead)	E200.7 (13 P.P. Met., water)	E206.2	E245.1	E270.2	SW3050/SW7000 (13 P.P. Met., soil)	SW3050/SW6010	SW7471	SW3050/SW7740	E625 (Extract, water)	SW3550/SW8270 (Extract, soil)	E160.1 (T.D.S.)	A429 (Anions)	A412D (Tot. CN, water/soil)	A403 (Alk.)	SW5030/SW8010 (Tot. H.S., soil)	SW5030/SW8015 (Non-H.V.O.C., water/soil)	SW1310 (EPA Tox., soil)				
0123			X		X																							
0124			X		X																							
0127	X																											
0129			X		X																							
0130			X		X																							
0133	X																											
0135			X		X																							
0136			X		X																							

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters	Stewart Scott	GOOD	9 Jan 87 / 09:15	Note VOC hold time is 2 wks.

Shipment to:

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

page 4 of 6

Method of Shipment:
RTI Project Name: S.JAFB
Contract Number:
RTI Project Number: 432U-2676-16

Note: Please return completed form to: Steve Winters
Hydrogeology Dept., Bld. 7, Rm. 110
R. T. I.

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Remarks
✓ 0139	MW-12, 20½' C	Landfill 1	Water	L to M	SW	8 Jan 87 11:00	1 L (G)	4°C	
✓ 0141	MW-12, 20½' E1								
✓ 0142	MW-12, 20½' E2						"		
✓ 0145	MW-44, 8' A1	Landfill 4				8 Jan 87 15:00	40 mL (G)		
✓ 0146	MW-44, 8' A2								
✓ 0149	MW-44, 8' C						1 L (G)		
✓ 0151	MW-44, 8' E1								
✓ 0152	MW-44, 8' E2								

Analyses

Sticker	E418.1 (Pet.HC, water)	SW3550/E418.1 (Pet.HC, soil)	SW5030/SW8020 (A.V.O.C., water)	SW5030/SW8020 (A.V.O.C., soil)	E601 (H.V.O.C., water)	SW5030/SW8010 (H.V.O.C., soil)	E239.2 (Lead)	E200.7 / E206.2 / E245.1 / E270.2 (13 P.P.Met., water)	SW3050/SW7060 / SW3050/SW6010 / SW7471 / SW3050/SW7740 (13 P.P.Met., soil)	E625 (Extract, water)	SW3550/SW8270 (Extract, soil)	E160.1 (T.D.S.)	A429 (Anions)	A5120 (Tot.Cn, water/soil)	A403 (Alk.)	SW5030/SW8010 (Tot.H.S., soil)	SW5030/SW8015 (Non-H.V.O.C., water/soil)	SW1310 (EPA Tox., soil)
0139	X																	
0141										X								
0142										X								
0145			X		X													
0146			X		X													
0149	X																	
0151										X								
0152										X								

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters	Stewart Scott	GOOD	9 Jan 87 / 9:15	Note 7 dk hold time on VOCs.

I-12

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

page 5 of 6

Shipment to:

Method of Shipment:
RTI Project Name: SJAFB
Contract Number:

RTI Project Number: 4324-2676-16

Note: Please return completed form to: Steve Winters
Hydrogeology Dept, Bld. 7, Rm 110
R.T.I.

	Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	E418.1 (Pet.HC,water)	SW3550/E418.1 (Pet.HC,soil)	SW5030/SW8020 (A.V.O.C.,water)	SW5030/SW8020 (A.V.O.C.,soil)	E601 (H.V.O.C.,water)	SW5030/SW8010 (H.V.O.C.,soil)	E239.2 (Lead)	E200.7 (13 P.P.Met.,water)	E206.2 (13 P.P.Met.,water)	E273.1 (13 P.P.Met.,water)	E270.2 (13 P.P.Met.,water)	SW3050/SW7060 (13 P.P.Met.,soil)	SW3050/SW6010 (13 P.P.Met.,soil)	SW7271 (13 P.P.Met.,soil)	SW3050/SW7740 (13 P.P.Met.,soil)	E625 (Extract.,water)	SW3550/SW8270 (Extract.,soil)	E160.1 (T.D.S.)	A429 (Anions)	A412D (Tot.CN,water/soil)	A403 (Alk.)	SW5030/SW8010 (Tot.H.S.,soil)	SW5030/SW8015 (Non-H.V.O.C.,water/soil)	SW3510 (EPA Tox.,soil)					Remarks
✓	0155	MW-45, 8' A1	Landfill 4	Water	L to M	S.W.	8 Jan 87 14:15	40 mL (G)	4°C			X		X																								
✓	0156	MW-45, 8' A2										X		X																								
✓	0159	MW-45, 8' C						1 L (G)		X																												
✓	0161	MW-45, 8' E1																							X													
✓	0162	MW-45, 8' E2																							X													
✓	0165	MW-46, 8' A1					8 Jan. 87 17:00	40 mL (G)				X		X																								
✓	0166	MW-46, 8' A2										X		X																								
✓	0169	MW-46, 8' C						1 L (G)		X																												

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters	Stewart Scott	GOOD	9 Jan. 87 / 09:15	Note 2 wk hold time on VOCs.

I-13

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

Shipment to:

Method of Shipment:
RTI Project Name: SJAFB
Contract Number:
RTI Project Number: 432U-2676-16

Note: Please return completed form to: Steve Winters, Hydrogeology Dept., Bld. 7, Rm. 110, R.T.I.

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Remarks
✓ 0171	MW-46, 8' E1	Landfill 4	Water	L to M	SW	8 Jan 89 17:00	1 L (G)	4°C	
✓ 0172	MW-46, 8' E2	↓	↓	↓	↓	↓	↓	↓	
			↓	↓	↓			↓	
✓ 0235	MW-55, 10' A1	Landfill 6	↓	↓	↓	8 Jan 89 17:00	40 mL (G)	↓	
✓ 0226	MW-55, 10' A2	↓	↓	↓	↓	↓	↓	↓	
		↓	↓	↓	↓	↓		↓	
✓ 0321	MW-02, 15' C	↓	↓	↓	↓	↓	1 L (G)	↓	MW-44, 8'D dup
		↓	↓	↓	↓	↓	↓	↓	
✓ 0227	MW-04, 10' E1	↓	↓	↓	↓	↓	↓	↓	
✓ 0228	MW-04, 10' E2	↓	↓	↓	↓	↓	↓	↓	

Analyses

Sticker	E418.1 (Pet. HC, water)	SW3550/E418.1 (Pet. HC, soil)	SW5030/SW8020 (A.V.O.C., water)	SW5030/SW8020 (A.V.O.C., soil)	E601 (H.V.O.C., water)	SW5030/SW8010 (H.V.O.C., soil)	E239.2 (Lead)	E200.7 ((1) P.P. Met., water)	E206.2	E213.1	E270.2	SW3050/SW7060 ((1) P.P. Met., soil)	SW3050/SW6010	SW7471	SW3050/SW7740	E625 (Extract., water)	SW3550/SW8270 (Extract., soil)	E160.1 (T.D.S.)	[illegible] (Anions)	[illegible] (Tot. CN, water/soil)	[illegible]	SW3050/SW6010 (Tot. H.S., soil)	SW5030/SW8015 (Non-H.V.O.C., water/soil)	SW1310 (EPA Tox., soil)			
0171																X											
0172																X											
0235			X		X																						
0226			X		X																						
0321	X																										
0227																X											
0228																X											

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters	Stewart Scott	GOOD	9 Jan 89/09:15	Note 2 wk hold time on VOCs.

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

page 1 of 10

Shipment to: [illegible]

Method of Shipment:
RTI Project Name: [illegible]
Contract Number:
RTI Project Number: 2576-16

Note: Please return completed form to: Steve Winters
Bld. 7, Rm. 110
RTI.

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses: E418.1	Analyses: SW5030/SW8010	Analyses: E601	Analyses: E625	Remarks
0196	MW-47, 10' A1	Landfill 4	water	L to M	[illegible]	9 Jan 87 09:15	40 mL (G)	4°C		X	X		
0197	MW-47, 10' A2	↓	↓	↓	↓	↓	↓	↓		X	X		
0206	MW-47, 10' C	↓	↓	↓	↓	↓	1 L (G)	↓	X				
0203	MW-47, 10' E1	↓	↓	↓	↓	↓	↓	↓				X	
0204	MW-47, 10' E2	↓	↓	↓	↓	↓	↓	↓				X	
0207	MW-49 8½' A1	↓	↓	↓	↓	9 Jan 87 13:40	40 mL (G)	↓		X	X		
0208	MW-49 8½' A2	↓	↓	↓	↓	↓	↓	↓		X	X		
0210	MW-49 8½' C	↓	↓	↓	↓	↓	1 L (G)	↓	X				

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
[signature] 14 Jan 87	Stewart Scott 1-14-87	GOOD	14 Jan 87	
	Received All samples on the above Date			

CHAIN OF CUSTODY

Shipment to:

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

page 1 of 16

Method of Shipment:
RTI Project Name: SJAFB
Contract Number:

RTI Project Number: 2676-16

Note: Please return completed form to: Steve Winters
Bld. 7, Rm. 110
RTI

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Remarks
0212	MW-49, 8½' E1	Landfill 4	water	L to M	SH/CW	9 Jan. 87 13:40	1 L(G)	4°C	
0214	MW-49, 8½' E2	↓	↓	↓	↓	↓	↓	↓	
0213	MW-48, 12' A1	↓	↓	↓	↓	9 Jan. 87 11:30	40 mL(G)	↓	
0217	MW-48, 12' A2	↓	↓	↓	↓	↓	↓	↓	
0220	MW-48, 12' C	↓	↓	↓	↓	↓	1 L(G)	↓	
0222	MW-48, 12' E1	↓	↓	↓	↓	↓	↓	↓	
0223	MW-48 12' E2	↓	↓	↓	↓	↓	↓	↓	

Analyses

Sticker	E418.1 (Pet. HC, water)	SW3550/E418.1 (Pet. HC, soil)	SW5030/SW8020 (A.V.O.C., water)	SW5030/SW8020 (A.V.O.C., soil)	E601 (H.V.O.C., water)	SW5030/SW8010 (H.V.O.C., soil)	E239.2 (Lead)	E200.7 (13 P.P. Met., water)	E206.2	E245.1	E270.2	SW3050/SW7060 (13 P.P. Met., soil)	SW3050/SW6010	SW7471	SW3050/SW7740	E625 (Extract, water)	SW3550/SW8270 (Extract, soil)	E160.1 (T.D.S.)	E300 (Anions)	[illegible] (Tot. [illegible], water/soil)	[illegible]	SW5030/SW8015 (Tot. H.S., soil)	SW5030/SW8015 (Non-H.V.O.C., water/soil)	SW1310 (EPA Tox., soil)			
0212																X											
0214																X											
0213			X		X																						
0217			X		X																						
0220	X																										
0222																X											
0223																X											

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters 14 Jan 87	Stewart Scott	GOOD	14 Jan 87	

page 1 of 10

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

Shipment to:

Method of Shipment:
RTI Project Name: 3JAFB
Contract Number:
RTI Project Number: 2676-16

Note: Please return completed form to: Steve Winters, Bld. 7, Rm. 110, R.T.I.

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses	Remarks
0229	MW-14, 16' A1	Landfill 4	Water	Low	SG/CW	9 Jan 87 17:00	40 ml (G)	4° C	SW5030/SW8020 (A.V.O.C., water); E601 (H.V.O.C., water)	
0230	MW-14, 16' A2	↓	↓	↓	↓	↓	↓	↓	SW5030/SW8020 (A.V.O.C., water); E601 (H.V.O.C., water)	
0233	MW-14, 16' C	↓	↓	↓	↓	↓	1 L (G)	↓	E418.1 (Pet. HC, water)	
0236	MW-14, 16' E1	↓	↓	↓	↓	↓	↓	↓	E625 (Extract., water)	
0237	MW-14, 16' E2	↓	↓	↓	↓	↓	↓	↓	E625 (Extract., water)	
0240	MW-13, 22' A1	↓	↓	↓	↓	12 Jan 87 10:05	40 ml (G)	↓	SW5030/SW8020 (A.V.O.C., water); E601 (H.V.O.C., water)	
0241	MW-13, 22' A2	↓	↓	↓	↓	↓	↓	↓	SW5030/SW8020 (A.V.O.C., water); E601 (H.V.O.C., water)	
0250	MW-13, 22' C	↓	↓	↓	↓	↓	1 L (G)	↓	E418.1 (Pet. HC, water)	

Analyses columns: E418.1 (Pet. HC, water); SW3550/E418.1 (Pet. HC, soil); SW5030/SW8020 (A.V.O.C., water); SW5030/SW8020 (A.V.O.C., soil); E601 (H.V.O.C., water); SW5030/SW8010 (H.V.O.C., soil); E239.2 (Lead); E200.7, E206.2, E245.1, E270.2 (13 P.P. Met., water); SW3050/SW7060, SW3050/SW8010, SW7471, SW3050/SW7740 (13 P.P. Met., soil); E625 (Extract., water); SW3550/SW8270 (Extract., soil); E160.1 (T.D.S.); A429 (Anions); A412B (Tot. CN, water/soil); (pH); SW5030/SW8010 (Tot. V.S., soil); SW5030/SW8015 (Nonh. V.O.C., water/soil); SW1310 (EPA Tox., soil)

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters 14 Jan 87	Stewart Scott	GOOD	14 Jan 87	

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

page 4 of 10

Shipment to:

Method of Shipment:
RTI Project Name: SJAFB
Contract Number:

RTI Project Number: 2676-16

Note: Please return completed form to: Steve Winters Bld. 7, Rm. 110 R.T.I.

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation
0251	MW-13, 22' E1	Landfill 4	Water	L to M	SG/CW	12 Jan 87 10:06	1 L (G)	4°C
0247	MW-13, 22' E2	↓				↓	↓	
0252	MW-56, 9' A1	Landfill 6				12 Jan 87 14:00	40 mL (G)	
0253	MW-56, 9' A2						↓	
0256	MW-56, 9' C						1 L (G)	
0262	MW-56, 9' E1							
0263	MW-56, 9' E2	↓	↓	↓	↓	↓	↓	↓

Analyses

Sticker	E418.1 (Pet.HC, water)	SW3550/E418.1 (Pet.HC, soil)	SW5030/SW8020 (A.V.O.C., water)	SW5030/SW8020 (A.V.O.C., soil)	E601 (H.V.O.C., water)	SW5030/SW8010 (H.V.O.C., soil)	E239.2 (Lead)	E200.7 (13 P.P.Met., water)	E206.2 (13 P.P.Met., water)	E245.1 (13 P.P.Met., water)	E270.2 (13 P.P.Met., water)	SW3050/SW7060 (13 P.P.Met., soil)	SW3050/SW6010 (13 P.P.Met., soil)	SW7471 (13 P.P.Met., soil)	SW3050/SW7740 (13 P.P.Met., soil)	E625 (Extract, water)	SW3550/SW8270 (Extract, soil)	E160.1 (T.D.S.)	A429 (Anions)	SW9120 (Tot.Cn, water/soil)	SW9045 (pH)	SW3550/SW8010 (Tot.H.V., soil)	SW5030/SW8015 (Nonhal.V.O.C., water/soil)	SW1310 (EPA Tox., soil)				Remarks
0251																X												
0247																X												
0252			X		X																							
0253			X		X																							
0256	X																											
0262																X												
0263																X												

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters 14 Jan 87	Stewart Scott	GOOD	14 Jan 87	

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

page 5 of 10

Shipment to:

Method of Shipment:
RTI Project Name: SOAFB
Contract Number:

RTI Project Number: 2676-16

Note: Please return completed form to: Steve Winters
Bld. 7 Rm. 110
R.T.I.

Sticker	Sample ID	Sampling Location	Sample Media	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Remarks
0175	SW-10 A1	Landfill 4	Water	L to M	SH/CW	12 Jan 87 10:50	40 ml (G)	4° C	
0176	SW-10 A2								
0179	SW-10 C						1 L (G)		
0181	SW-10 E1								
0182	SW-10 E2								
0185	SW-11 A1					12 Jan 87 09:50	40 ml (G)		
0186	SW-11 A2								
0195	SW-11 C						1 L (G)		

Analyses

Sticker	E418.1 (Pet.HC, water)	SW3550/E418.1 (Pet.HC, soil)	SW5030/SW8020 (A.V.O.C., water)	SW5030/SW8020 (A.V.O.C., soil)	E601 (H.V.O.C., water)	SW5030/SW8010 (H.V.O.C., soil)	E239.2 (Lead)	E200.7 (13 P.P. Met., water)	E206.2	E272.1	E270.2	SW3050/SW7060 (13 P.P. Met., soil)	SW3050/SW6010	SW7471	SW3050/SW7740	E625 (Extract, water)	SW3550/SW8270 (Extract, soil)	E160.1 (T.D.S.)	A429 (Anions)	A412D (Tot. CN, water/soil)	A403 (Alk.)	SW3050/SW8010 (Tot. H.S., soil)	SW5030/SW8015 (non-H.V.O.C., water/soil)	SW1310 (EPA Tox., soil)
0175			X		X																			
0176			X		X																			
0179	X																							
0181																X								
0182																X								
0185			X		X																			
0186			X		X																			
0195	X																							

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters 14 Jan 87	Stewart Scott	GOOD	14 Jan 87	

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

Shipment to:

Method of Shipment:
RTI Project Name: SOAEB
Contract Number:
RTI Project Number: 2673-16

Note: Please return completed form to: Steve Winters
Bld. 7 Rm. 110
R.T.I.

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses	Remarks
0191	SW-11 E1	Landfill 4	Water	L to M	SA/CW	14 Jan 87 09:50	1L (G)	4°C	X — E625 (Extract., water)	
0192	SW-11 E2	↓	↓	↓	↓	↓	↓	↓	X — E625 (Extract., water)	
0264	MW-51, 8' A1	Landfill 3	↓	↓	↓	12 Jan 87 15:30	40mL (G)	↓	X — SW5030/SW8020 (A.V.O.C., water); X — E601 (H.V.O.C., water)	
0265	MW-51, 8' A2	↓	↓	↓	↓	↓	↓	↓	X — SW5030/SW8020 (A.V.O.C., water); X — E601 (H.V.O.C., water)	
0269	MW-51, 8' C	↓	↓	↓	↓	↓	1L (G)	↓	X — E418.1 (Pet.HC, water)	
0271	MW-51, 8' E1	↓	↓	↓	↓	↓	↓	↓	X — E625 (Extract., water)	
0272	MW-51, 8' E2	↓	↓	↓	↓	↓	↓	↓	X — E625 (Extract., water)	

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters 14 Jan 87	Stewart Scott	GOOD	14 Jan 87	

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

page 7 of 10

Shipment to:

Method of Shipment:
RTI Project Name: ITAFB
Contract Number:
RTI Project Number: 2676-16

Note: Please return completed form to: Steve Winters
Bld. 7, Rm. 110
R.T.I.

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses	Remarks
0286	MW-53, 7' A1	Landfill 3	Water	L to M	SG/KW	12 Jan. 87 17:00	40mL (G)	4°C	SW5030/SW8020; E601	
0287	MW-53, 7' A2	↓	↓	↓	↓	↓	↓	↓	SW5030/SW8020; E601	
0290	MW-53, 7' C	↓	↓	↓	↓	↓	1 L (G)	↓	E418.1	
0293	MW-53, 7' E1	↓	↓	↓	↓	↓	↓	↓	E625	
0294	MW-53, 7' E2	↓	↓	↓	↓	↓	↓	↓	E625	
0275	MW-52, 7' A1	↓	↓	↓	↓	13 Jan. 87 09:30	40mL (G)	↓	SW5030/SW8020; E601	
0276	MW-52, 7' A2	↓	↓	↓	↓	↓	↓	↓	SW5030/SW8020; E601	
0280	MW-52 7' C	↓	↓	↓	↓	↓	1 L (G)	↓	E418.1	

Analyses columns printed on form: E418.1 (Pet.HC, water); SW3550/E418.1 (Pet.HC, soil); SW5030/SW8020 (A.V.O.C., water); SW5030/SW8020 (A.V.O.C., soil); E601 (H.V.O.C., water); SW5030/SW8010 (H.V.O.C., soil); E239.2 (Lead); E200.7, E206.2, E213.1, E270.2 (13 P.P. Met., water); SW3050/SW7060, SW3050/SW6010, SW7471, SW3050/SW7740 (13 P.P. Met., soil); E625 (Extract., water); SW3550/SW8270 (Extract., soil); E160.1 (T.D.S.); (Anions); (TOX, TOC, water/soil); (Alk.); SW3050/SW8010 (Tot. H.S., soil); SW5030/SW8015 (Non-hal. V.O.C., water/soil); SW1310 (EPA Tox., soil)

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters 14 Jan 87	Stewart Scott	GOOD	14 Jan 87	

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

page 8 of 10

Shipment to:

Method of Shipment:
RTI Project Name: STEEB
Contract Number:
RTI Project Number: 2676-16

Note: Please return completed form to: Steve Winters Bld. 7, Rm. 110 R.T.I.

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses	Remarks
0282	MW-52, 7' E1	Landfill 3	Water	L to M	SG/CW	13 Jan 87 09:30	1 L (G)	4°C	X — E625 (Extract, water)	
0283	MW-52, 7' E2	↓	↓	↓	↓	↓	↓	↓	X — E625 (Extract, water)	
0297	MW-54, 15' A1	DPDC	Water		SG/CW	13 Jan 87 12:30	40 mL (G)	↓	X — SW5030/SW8020 (A.V.O.C., water); X — E601 (H.V.O.C., water)	
0298	MW-54, 15' A2	↓	↓	↓	↓	↓	↓	↓	X — SW5030/SW8020 (A.V.O.C., water); X — E601 (H.V.O.C., water)	
0301	MW-54, 15' C1	↓	↓	↓	↓	↓	↓	↓	X — SW9010/SW9015	
0302	MW-54, 15' C2	↓	↓	↓	↓	↓	↓	↓	X — SW9010/SW9015	
0306	MW-54, 15' E	↓	↓	↓	↓	↓	1 L (G)	↓	X — E418.1 (Pet. HC, water)	

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters 14 Jan 87	Stewart Scott	GOOD	14 Jan 87	

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

Shipment to:

Method of Shipment:
RTI Project Name: SJAFB
Contract Number:

RTI Project Number: 2676-16

Note: Please return completed form to: Steve Winters
Bldg. 7 Rm. 110
R.T.I.

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	E418.1 (Pet. HC, water)	SW5030/SW8020 (A.V.O.C., water)	E601 (H.V.O.C., water)	E625 (Extract, water)	Remarks
0308	MW-54, 15' G1	DPDO	Water	L to M	SH/LW	13 Jan 87 12:30	1 L (G)	4°C				X	
0309	MW-54, 15' G2											X	
0314	MW-57, 10' A1	Landfill 6					40 ml (G)			X	X		
0315	MW-57, 10' A2									X	X		
0316	MW-57, 10' C						1 L (G)		X				
0317	MW-57, 10' E1											X	
0318	MW-57, 10' E2											X	

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters 14 Jan 87	Stewart Scott	GOOD	14 Jan 87	

I-23

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

Shipment to:

Method of Shipment:
RTI Project Name: SJAFB
Contract Number:

RTI Project Number: 2676-16

Note: Please return completed form to: Steve Winters
Bld. 7, Rm. 110
R.T.I.

Sticker	Sample ID	Sampling Location	Sample Media	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses: SW5030/SW8015	Remarks
0312	MW-SE, 11' C1	Landfill 6	Water	L to M	SA/CW	13 Jan 87 14:00	40 ml(G)	4°C	X	
0313	MW-SE, 11' C2	↓	↓	↓	↓	↓	↓	↓	X	

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters 14 Jan 87	Stewart Scott	GOOD	14 Jan 87	

Shipment to: RTI
Environmental Chem. Dept.
att: P. Grohse / B. Wilson

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

Copy 21 Jan '87 Delivery

page 1 of 4

Method of Shipment:
RTI Project Name: SJAFB
Contract Number:
RTI Project Number: 2696-16

Note: Please return completed form to: Steve Winters
Hydrogeology Dept., Bld. 7, Rm 110
R.T.I.

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Remarks
0392	MW-40, 11½' J	FTA 3	Wtr	L to M	SG/CW/JW	13 Jan '87 17:22	250 mL (TFA)	~1 mL HNO_3; 4°C	Lead, Filtered (0.45 µm)
0395	MW-43, 18' J	LF4	↓	↓	↓	14 Jan '87 17:37	1 L (P)	none; 4°C	Anions; Filtered
0397	MW-43, 18' L	↓	↓	↓	↓	↓	" ↓	~5 mL HNO_3; 4°C	Metals; Filtered
0399	MW-43, 18' N	↓	↓	↓	↓	↓	250 mL (P)	~2.5 mL HNO_3; 4°C	TDS; Filtered
0319	MW-50, 15.6' J	LF3	↓	↓	↓	15 Jan '87 09:30	1 L (P)	none; 4°C	Anions; Filtered
0221	MW-50, 15.6' L	↓	↓	↓	↓	↓	↓	~5 mL HNO_3; 4°C	Metals; Filtered
0323	MW-50, 15.6' N	↓	↓	↓	↓	↓	250 mL (P)	~2 mL HNO_3; 4°C	TDS; Filtered
0325	MW-11, 20' J	FTA 3	↓	↓	↓	15 Jan '87 11:00	250 mL (TFA)	~2 mL HNO_3; 4°C	Lead; Filtered

Analyses

Sticker	E418.1 (Pet. HC, water)	SW3550/E418.1 (Pet. HC, soil)	SW5030/SW8020 (A.V.O.C., water)	SW5030/SW8020 (A.V.O.C., soil)	E601 (H.V.O.C., water)	SW5030/SW8010 (H.V.O.C., soil)	E239.2 (Lead)	E200.7 (1) P.P. Met., water	E206.2	E245.1	E270.2	SW3050/SW7060 (1) P.P. Met., soil	SW3050/SW6010	SW7471	SW3050/SW7740	E625 (Extract, water)	SW3550/SW8270 (Extract, soil)	E160.1 (T.D.S.)	A429 (Anions)	A412D (Tot. CN water/soil)	A403 (Alk.)	SW5030/SW8010 (Tot. H.S., soil)	SW5030/SW8015 (Non-H.V.O.C., water/soil)	SW1310 (EPA Tox., soil)
0392							X																	
0395																			X					
0397								X	X	X	X													
0399																		X						
0319																			X					
0221								X	X	X	X													
0323																		X						
0325							X																	

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Steve Winters	B. Wilson		20 Jan 87	

To: R.T.I.
Env. Chem. Dept.

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Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

page 2 of 4

Project Name: SJAFB
All Project Numbers: 2676-16

Please return completed form to: S. Winters
Hydrogeology, Bld. 2, Rm. 116
R.T.I.

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses	Remarks
0327	MW-41, 12' J	FTA 3	water	L to M	SH/CW/SV	15 Jan. 87 16:00	250 mL (TeP)	~2 mL HNO_3; 4°C	X	Lead; Filtered
0329	MW-42, 13' J					15 Jan. 87 17:00			X	
0331	MW-12, 20' J	LF1				16 Jan. 87 09:45	1 L (P)	none; 4°C	X	Anions; Filtered
0333	MW-12, 20' L							~5 mL HNO_3; 4°C	X X X X	Metals;
0335	MW-12, 20' N						250 mL (P)	~2 mL HNO_3; 4°C	X	TDS;
0338	MW-44, 10' J	LF4				16 Jan. 87 12:00	1 L (P)	none; 4°C	X	Anions;
0340	MW-44, 10' L							~5 mL HNO_3; 4°C	X X X X	Metals;
0342	MW-44, 10' N						250 mL (P)	~2 mL HNO_3; 4°C	X	TDS;

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Steve White	B. Wilson		20 Jan 87	

To: RTI
Env. Chem. Dept.

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Research Triangle Park, NC 27709

page 3 of 4

Mode of Shipment:
Project Name: SJAFB
Contract Number:

RTI Project Number: 2676-16

Please return completed form to: S. Winters
Hydrogeology, Bld. 7, Rm. 110
RTI

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses	Remarks
0344	MW-45, 9' J	LF4	Water	L to M	SH/CW/JV	16 Jan 87 15:30	1 L(P)	none; 4°C	X	Anions; Filtered
0355	MW-45, 9' L	↓	↓	↓	↓	↓	↓	~5 mL HNO_3; 4°C	XXXX	Metals;
0347	MW-45, 9' N	↓	↓	↓	↓	↓	250 mL(P)	~2 mL HNO_3; 4°C	X	T.D.S.;
0350	MW-46, 9' J	↓	↓	↓	↓	16 Jan 87 17:30	1 L(P)	none; 4°C	X	Anions;
0352	MW-46, 9' L	↓	↓	↓	↓	↓	↓	~5 mL HNO_3; 4°C	XXXX	Metals;
0354	MW-46, 9' N	↓	↓	↓	↓	↓	250 mL(P)	~2 mL HNO_3; 4°C	X	T.D.S.;
0401	MW-47, 10' J	↓	↓	↓	↓	20 Jan 87 13:00	250 mL(P)	none; 4°C	X	Anions;
0403	MW-47, 10' L	↓	↓	↓	↓	↓	↓	~2 mL HNO_3; 4°C	XXXX	Metals;
0369	MW-47, 10' N	↓	↓	↓	↓	↓	↓	~2 mL HNO_3; 4°C	X	T.D.S.;

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Steve Watts	B. [illegible]		20 Jan 87	

To: R.T.I.
Env. Chem Dept

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Research Triangle Park, NC 27709

page 4 of 4

Method of Shipment:
RTI Project Name: SJAFB
Contract Number:
All Project Numbers: 2676-16

Note: Please return completed form to: S. Winters, Hydrogeology, Bld. 7, Rm 110, RTI

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses	Remarks
0427	MW-01, 10' K	F.T.A. 7	Water	L to M	SA/LM/SW	15 Jan 87 11:30	250 mL (Tef)	~2 mL HNO3; 4°C	X	Lead; Filtered
0432	MW-56, 21' M	L.F. 6	↓	↓	↓	16 Jan 87 10:00	1 L (P)	~5 mL HNO3; 4°C	XXXX	metals;
0423	MW-56, 21' O	↓	↓	↓	↓	↓	250 mL (P)	~2 mL HNO3; 4°C	X	TDS;
0341	SD-12 C	L.F. 4	soil	↓	↓	20 Jan 87 10:00	½ pt wide mouth jar (G)	4°C	XXXX	metals; Soil
0358	SD-13 C	↓	↓	↓	↓	20 Jan 87 11:00	↓	4°C	XXXX	metals; Soil

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Steve Winters	B. Wilson		20 Jan 87	

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page 1 of 3

Report to: RTI
Envir. Chem.

Method of Shipment:
Project Name: SJAFB
Contract Number:

RTI Project Number: 2676-16

Please return completed form to: Steve Winters
RTI

Sticker	Sample ID		Sampling Location	Sample Medium	Suspected Sample Conc. (L,M,H)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses	Remarks
0405	MW-49 8'	J	Landfill 4	Water	L to M	SA/CW/SW	20 Jan 87 17:30	250 mL (P)	none; 4°C	X	Anions; filtered
0407	MW-49 8'	L							~2 mL HNO_3; 4°C	XXXX	13 metals;
0409	MW-49 8'	N								X	TDS ;
0411	MW-48 8'	J					20 Jan 87 16:00	1 L (P)	none; 4°C	X	Anions;
0413	MW-48 8'	L							~5 mL HNO_3; 4°C	XXXX	13 metals;
0415	MW-48 8'	N						250 mL (P)	~2 mL HNO_3; 4°C	X	TDS ;
0417	MW-14 11'	J					20 Jan 87 17:00	1 L (P)	none; 4°C	X	Anions;
0419	MW-14 11'	L							~5 mL HNO_3; 4°C	XXXX	13 metals;
0421	MW-14 11'	N						250 mL (P)	~2 mL HNO_3; 4°C	X	TDS ;

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Steve Winters 29 Jan 87 (3:15 pm)	Eva D. Estes		29 Jan 87	

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Shipment to: RTI
Env. Chem.

Method of Shipment:
All Project Name: SJAFB
Contract Number:
All Project Number: 2676-16

Note: Please return completed form to: Steve Winters
R.T.I.

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analysis	Remarks
0424	MW-13, 22' J	Landfill 4	water	L to M	SH/CW/SW	21 Jan 87 13:00	1(L) ?	none; 4°C	X	Anions; filtered
0426	MW-13, 22' L	↓	↓	↓	↓	↓	↓	~5 mL HNO_3; 4°C	XXXX	13 metals;
0429	MW-13, 22' N	↓	↓	↓	↓	↓	250 mL (P)	~2 mL HNO_3; 4°C	X	TDS;
0431	SW-10, J	↓	↓	↓	↓	21 Jan 87 1330	250 mL (P)	none; 4°C	X	Anions;
0434	SW-10, L	↓	↓	↓	↓	↓	↓	~2 mL HNO_3; 4°C	XXXX	13 metals;
0436	SW-10, N	↓	↓	↓	↓	↓	↓	↓	X	TDS;
0438	MW-51, 6' J	Landfill 3	↓	↓	↓	21 Jan 87 1600	250 mL (P)	none; 4°C	X	Anions;
0444	MW-51, 6' L	↓	↓	↓	↓	↓	↓	~2 mL HNO_3; 4°C	XXXX	13 metals;
0442	MW-51, 6' N	↓	↓	↓	↓	↓	↓	↓	X	TDS;

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Steve Winters 29 Jan 87 (3:15pm)	Eva D. Estes		29 Jan 87	

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Research Triangle Park, NC 27709

Page 3 of 7

Shipment to: RTI Env. Chem.

Method of Shipment:
RTI Project Name: SJAFB
Contract Number:
RTI Project Number: 2676-16

Note: Please return completed form to: S. Winters RTI

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container type/vol.	Preservation	Remarks
0446	MW-60 10' J	Landfill 6	Water	L-M	SG/CW/SW	21 Jan 87 1800	1 L (P)	None; 4°C	Anions; Filtered
0447	MW-60 10' L	↓	↓	↓	↓	↓	↓	~5 mL HNO_3; 4°C	13 metals;
0448	MW-60 10' N	↓	↓	↓	↓	↓	250 mL (P)	~2 mL HNO_3; 4°C	TDS;
0455	MW-60 10' O	↓	↓	↓	↓	↓	" 250 mL (TP)	~2 mL HNO_3; 4°C	Lead;
0449	MW-53 7.5' J	Landfill 3	↓	↓	↓	21 Jan 87 1805	1 L (P)	None; 4°C	Anions;
0451	MW-53 7.5' L	↓	↓	↓	↓	↓	↓	~5 mL HNO_3; 4°C	13 metals;
0453	MW-53 7.5' N	↓	↓	↓	↓	↓	250 mL (P)	~2 mL HNO_3; 4°C	TDS;
0456	SW-11 J	Landfill 4	↓	↓	↓	21 Jan 87 0915	250 mL (P)	None; 4°C	Anions;
0458	SW-11 L	↓	↓	↓	↓	↓	↓	~2 mL HNO_3; 4°C	13 metals;
0460	SW-11 N	↓	↓	↓	↓	↓	↓	↓	TDS; ↓

Analyses

Sticker	E418.1 (Pet. HC, water)	SW3550/E418.1 (Pet. HC, soil)	SW5030/SW8020 (A.V.O.C., water)	SW5030/SW8020 (A.V.O.C., soil)	E601 (H.V.O.C., water)	SW5030/SW8010 (H.V.O.C., soil)	[illegible] (Lead)	E200.7 ((1) P.P. Met., water)	E206.2	E213.1	E270.2	SW3050/SW7060 ((1) P.P. Met., soil)	SW3050/SW6010	SW7421	SW3050/SW7740	E625 (Extract., water)	SW3550/SW8270 (Extract., soil)	E160.1 (T.D.S.)	[illegible] (Anions)	[illegible] (Tot. Sn, water/soil)	[illegible]	SW5030/SW8010 (Tot. H.S., soil)	SW5030/SW8015 (Non-H.V.O.C., water/soil)	SW1310 (EPA Tox., soil)				
0446																			X									
0447								X	X	X	X																	
0448																		X										
0455							X																					
0449																			X									
0451								X	X	X	X																	
0453																		X										
0456																			X									
0458								X	X	X	X																	
0460																		X										

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Steve Winters 29 Jan 87 (3:15 pm)	Eva D. Estes		29 Jan 87	

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P.O. Box 12194
Research Triangle Park, NC 27709

Shipment to: RTI Env. Chem.

Method of Shipment:
RTI Project Name: SUAER
Contract Number:
RTI Project Number: 2676-16

Note: Please return completed form to: S. Winters RTI.

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses	Remarks
0362	SD-15, C	D.P. D. O.	soil	L to M	SA/SW	23 Jan 87 1030	1/2 pt glass Mason jar	4°C	XXXX X	13 metals; CN^-_{TOTAL}
0360	SD-14, C	↓	↓	↓	↓	↓	↓	↓	XXXX X	↓
0462	MW-54, 14' J	↓	Water	↓	SA/CH/SW	23 Jan 87 1330	1 L (P)	none; 4°C	X	Anions; Filtered
0464	MW-54, 14' L	↓	↓	↓	↓	↓	1 L (P)	~5 mL HNO_3; 4°C	XXXX	13 metals;
0538	MW-54, 14' N	↓	↓	↓	↓	↓	1 L (P)	~6 mL NaOH; 4°C	X	CN^-_{TOTAL};
0468	MW-54, 14' P	↓	↓	↓	↓	↓	250 mL (P)	~2 mL HNO_3; 4°C	X	T.D.S.;
0470	MW-54, 14 R	↓	↓	↓	↓	↓	1 L (P)	none; 4°C	X	Alkalinity; Unfiltered

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters 29 Jan 87 (3:15 pm)	Eva D. Estes		29 Jan 87	

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page 5 of 7

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

Shipment to: R.T.I. Env. Chem.

Method of Shipment:
RTI Project Name: SOAER
Contract Number:

RTI Project Number: 2676-16

Note: Please return completed form to: S. Winters RTI.

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Remarks
0472	MW-62, 11' L	Landfill B	Water	LbM	SD/SW	23 Jan 87 1600	1 L (P)	~5 mL HNO_3; 4°C	13 metals; filtered
0473	MW-62, 11' N							~6 mL NaOH; 4°C	CN^-_{total};
0475	MW-62, 11' R							none; 4°C	Alkalinity; Unfiltered
0504	SW-13, J	D.P.D.O.				29 Jan 87 1100	1 L (P)	none; 4°C	Anions; filtered
0506	SW-13, L							~5 mL HNO_3; 4°C	13 Metals;
0508	SW-13, N							~6 mL NaOH; 4°C	CN^-_{total};
0510	SW-13, P						250 mL (P)	~2 mL HNO_3; 4°C	TDS;
0512	SW-13, R						1 L (P)	none; 4°C	Alkalinity; Unfiltered

Analyses:

Sticker	E418.1 (Pet.HC, water)	SW3550/E418.1 (Pet.HC, soil)	SW5030/SW8020 (A.V.O.C., water)	SW5030/SW8020 (A.V.O.C., soil)	E601 (H.V.O.C., water)	SW5030/SW8010 (H.V.O.C., soil)	E239.2 (Lead)	E200.7 (13 P.P. Met., water)	E206.2	E245.1	E270.2	SW3050/SW7060 (13 P.P. Met., soil)	SW3050/SW6010	SW7471	SW3050/SW7740	E625 (Extract, water)	SW3550/SW8270 (Extract, soil)	E160.1 (T.D.S.)	A429 (Anions)	A412D (Tot.CN, water/soil)	A403 (Alk.)	SW3050/SW6010 (Tot.R.S., soil)	SW5030/SW8015 (Non-H.V.O.C., water/soil)	SW1310 (EPA Tox., soil)				
0472								X	X	X	X																	
0473																				X								
0475																					X							
0504																			X									
0506								X	X	X	X																	
0508																				X								
0510																		X										
0512																					X							

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters 29 Jan 87 (3:15 pm)	Eva D. Estes		29 Jan 87	

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Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

Shipment to: RTI Env. Chem.

Method of Shipment:
RTI Project Name: SJAFB
Contract Number:
RTI Project Number: 2676-16

Note: Please return completed form to: S. Winters R.T.I

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses	Remarks
0524	MW-52, 8' J	Landfill 3	Water	L to M	SW/GW/SW	28 Jan 87 1330	250 mL (P)	none; 4°C	X	Anions; filtered
0526	MW-52, 8' L	↓	↓	↓	↓	↓	↓	~2 mL HNO_3; 4°C	X X X X	13 metals;
0528	MW-52, 8' N	↓	↓	↓	↓	↓	↓	↓	X	TDS;
0514	SW-12, J	DPDO	↓	↓	SW/SW	28 Jan 87 1245	250 mL (P)	none; 4°C	X	Anions; filtered
0516	SW-12, L	↓	↓	↓	↓	↓	↓	~2 mL HNO_3; 4°C	X X X X	13 metals;
0518	SW-12, N	↓	↓	↓	↓	↓	↓	~3 mL NaOH; 4°C	X	CN^-_{Tot};
0520	SW-12, P	↓	↓	↓	↓	↓	↓	~2 mL HNO_3; 4°C	X	TDS;
0522	SW-12, R	↓	↓	↓	↓	↓	1 L (P)	none; 4°C	X	Alkalinity; Unfiltered

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters 29 Jan '87 (3:15pm)	Evan D. Estes		29 Jan 87	

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Research Triangle Park, NC 27709

Page 7 of 7

Shipment to: R.T.I.
Env. Chem.

Method of Shipment:
RTI Project Name: SJAFB
RTI Project Number: 2676-16
Contract Number:

Note: Please return completed form to: Steve Winters
R.T.I.

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container type/vol.	Preservation	Analyses	Remarks
0530	MW-08, 15' K	Landfill 8	Water	L & M	SH/LW/SW	28 Jan '87 1400	250 mL (P)	none; 4°C	X	Anions; Filtered
0532	MW-08, 15' M	↓	↓	↓	↓	28 Jan '87 0900	↓	HNO_3 ~2 mL; 4°C	X X X X	13 metals;
0531	MW-09, 14' K	↓	↓	↓	↓	20 Jan '87 1430	1 L (P)	none; 4°C	X	Anions;
0536	SW-20, 0	↓	↓	↓	↓	28 Jan '87 1730	250 mL (P)	~3 mL NaOH; 4°C	X	CN^-_{TOTAL};
0534	MW-07, 10' S	↓	↓	↓	↓	23 Jan '87 1500	1 L (P)	none; 4°C	X	Alk.; Unfiltered
0535	MW-07, 10' O	↓	↓	↓	↓	28 Jan '87 1730	250 mL (P)	HNO_3 ~2 mL; 4°C	X	TDS; filtered

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters 29 Jan '87 (3:15 pm)	Evan D. Estes		29 Jan 87	

page 1 of 1

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Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

Shipment to: IEA labs. / 21 Jan '87 billing A.3C)
Cary, NC

Method of Shipment:
RTI Project Name: 3JAFB
Contract Number:
RTI Project Number: 2676-16

Note: Please return completed form to: Steve Winters
Hydrogeology Dept., Bld. 7, Rm. 110
RTI

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses	Remarks
0371	SD-12 A	Landfill 4	soil	L to M	SH/SW	20 Jan 87 10:00	4" brass tubes Al-lined caps	4°C	X: SW3550/E418.1 (Pet.HC, soil); SW3550/SW8020 (A.V.O.C., soil); SW3550/SW8010 (H.V.O.C., soil); SW3550/SW8270 (Extract, soil); SW3550/SW8015 (Nonhal.V.O.C., soil)	Please return tubes
0375	SD-13 A	↓	↓	↓	↓	20 Jan 87 11:00	↓	↓	X: same as above	↓

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters 21 Jan '87 10:00	Ronald Braun 1-21-87 10:00 AM			

30 January '87 delivery

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

page 1 of 3

Shipment to: IEA Labs.
Cary, NC

Method of Shipment:
RTI Project Name: SJAEB
Contract Number:

RTI Project Number: 2676-16

Note: Please return completed form to: Steve Winters
R.T.I.

Analyses: E418.1 (Pet.HC,water); SW3550/E418.1 (Pet.HC,soil); SW5030/SW8020 (A.V.O.C.,water); SW3550/SW8020 (A.V.O.C.,soil); E601 (H.V.O.C.,water); SW3550/SW8010 (H.V.O.C.,soil); E239.2 (Lead); E200.7, E206.2, E245.1, E270.2 ((1) P.P.Met.,water); SW3050/SW7060, SW3050/SW6010, SW7471, SW3050/SW7740 ((1) P.P.Met.,soil); E625 (Extract.,water); SW3550/SW8270 (Extract.,soil); E160.1 (T.D.S.); A429 (Anions); A412B (TOC,water/soil); A403 (Alk.); SW5030/SW8010 (TOX,H.S.,soil); SW5030/SW8015 (Nonh.V.O.C.,water/soil); SW1310 (EPA Tox.,soil)

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses (X)	Remarks
0385	SD-15, A	DPDO	soil	L to M	SW/SW	23 Jan 87 1030	1½" x 4" brass tubes	none; 4°C	SW3550/E418.1; SW3550/SW8020; SW3550/SW8010; SW3550/SW8270; SW5030/SW8015	soil volatiles and extractables
0379	SD-14, A	↓	↓	↓	↓	23 Jan 87 1300	1½" x 4" brass tubes	↓	SW3550/E418.1; SW3550/SW8020; SW3550/SW8010; SW3550/SW8270; SW5030/SW8015	↓
0476	SW-12, A1	↓	water	↓	↓	28 Jan 87 1100	40 mL (G)	↓	SW5030/SW8020; E601	AVOCs/HVOCs
0477	SW-12, A2	↓	↓	↓	↓	↓	↓	↓	SW5030/SW8020; E601	↓
0480	SW-12, C1	↓	↓	↓	↓	↓	↓	↓	SW5030/SW8015	Non-HVOCs
0481	SW-12, C2	↓	↓	↓	↓	↓	↓	↓	SW5030/SW8015	↓
0484	SW-12, E	↓	↓	↓	↓	↓	1 L (G)	↓	E418.1	Pet HCs

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters 30 Jan 87 0945	Ronald Brown	Good	1-30-87 9:54 am	

I-37

page 2 of 3

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

Shipment to: IEA Labs
Cary, NC

Method of Shipment:
RTI Project Name: 3JAEB
Contract Number:

RTI Project Number: 2676-16

Note: Please return completed form to: S. Winters
R.T.I.

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Remarks
0486	SW-12, G1	DPDO	Water	L to M	SH/SW	28 Jan 87 1108	1 L (G)	None; 4°C	Extra.
0487	SW-12, G2								
0490	SW-13, A1					28 Jan 87 1200	40 mL (G)		AVOCs/HVOCs
0491	SW-13, A2								
0494	SW-13, C1								Non-HVOCs
0495	SW-13, C2								
0498	SW-13, E						1 L (G)		Pet. HCs

Analyses

Sticker	E418.1 (Pet.HC, water)	SW3550/E418.1 (Pet.HC, soil)	SW5030/SW8020 (A.V.O.C., water)	SW5030/SW8020 (A.V.O.C., soil)	E601 (H.V.O.C., water)	SW5030/SW8010 (H.V.O.C., soil)	E239.2 (Lead)	E200.7 (13 P.P.Met., water)	E206.2	E245.1	E270.2	SW3050/SW7060 (13 P.P.Met., soil)	SW3050/SW6010	SW7471	SW3050/SW7740	E625 (Extract, water)	SW3550/SW8270 (Extract, soil)	E160.1 (T.D.S.)	A429 (Anions)	A412D (Tot.CN, water/soil)	A403 (TPH)	SW5030/SW8010 (Tot.H.S., soil)	SW5030/SW8015 (Non-H.V.O.C., water/soil)	SW3310 (EPA Tox., soil)			
0486																X											
0487																X											
0490			X		X																						
0491			X		X																						
0494																							X				
0495																							X				
0498	X																										

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters 30 Jan 87 0945	Ronald Brown	Good	1-30-87 9:54am	

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

Shipment to: IEA Labs Cary, NC

Method of Shipment:
RTI Project Name: SJ-3
Contract Number:

RTI Project Number: 2676-16

Note: Please return completed form to: Steve Winters R.T.I

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses	Remarks
0500	SW-13, G1	DPDO	Water	L to M	SB/SW	28 Jan 87 1200	1 L (G)	none; 4°C	X	Extr.
0501	SW-13, G2	↓	↓	↓	↓	↓	↓	↓	X	↓

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters 30 Jan 87 0945	Ronald Braun	Good	1-30-87 9:54am	

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

page 1 of 1

Shipment to: IEA Labs
Cary, NC

4 Feb 87 delivery

Method of Shipment:
RTI Project Name: SJAFB
Contract Number:

RTI Project Number: 2676-16

Note: Please return completed form to: S. Winters
R.T.I.

Sticker No.	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses	Remarks
0537	MW-58, 11' D2	Landfill E	Water	L to M	SH/CW	28 Jan 87 1100	40 mL (G)	none; 4°C	X	Non-HVOCs Watch holding time!
0466	MW-58 11' D3	↓	↓	↓	↓	↓	"	↓	X	↓

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
[illegible signature]	Ronald Brown	Good	2-4-87 4:24 pm	

I-40

SECTION I-3

FEBRUARY/MARCH SAMPLING

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

Shipment to: IEA Labs, Cary, NC

Method of Shipment:
RTI Project Name: SJAFB
Contract Number:
RTI Project Number: 2676-16

Note: Please return completed form to: Steve Winters R.T.I.

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Remarks
0806	SD-12, A1	LF4	soil	L→M	SA/CW	25 Feb. '87 16:35	4"x2" brass tubes	4°C	Soil AVOCs/HVOCs
~~0565~~	~~SD-12, A2~~								~~Save for positive confirmations~~
0807	SD-13, A1					25 Feb. '87 17:05	"		Soil AVOCs/HVOCs
~~0566~~	~~SD-13, A2~~								~~Save for positive confirmations~~
0579	MW-41, 12.5' A1	FTA	water	L		25 Feb '87 16:00	40 mL (G)		Attempt AVOC/HVOCs analyses from one vial
0580	MW-41, 12.5' A2								Save for positive confirmations
0581	MW-44, 8' A1	LF4				25 Feb '87 16:05			Attempt AVOC/HVOCs analyses from one vial
0582	MW-44, 8' A2								Save for positive confirmations

Analytes

Sticker	E418.1 (Pet.HC,water)	SW3550/E418.1 (Pet.HC,soil)	SW5030/SW8020 (A.V.O.C.,water)	SW5030/SW8020 (A.V.O.C.,soil)	E601 (H.V.O.C.,water)	SW5030/SW8010 (H.V.O.C.,soil)	E239.2 (Lead)	E200.7 (13 P.P.Met.,water)	E206.2	E213.1	E270.2	SW3050/SW7060 (13 P.P.Met.,soil)	SW3050/SW6010	SW7421	SW3050/SW7740	E625 (Extract,water)	SW3550/SW8270 (Extract,soil)	E160.1 (T.D.S.)	A429 (Anions)	A412D (Tot.CN,water/soil)	A403 (Alk.)	SW5030/SW8010 (Tot.H.S.,soil)	SW5030/SW8015 (Non-H.V.O.C.,water/soil)	SW1310 (EPA Tox.,soil)			
0806				X		X																					
~~0565~~																											
0807				X		X																					
~~0566~~																											
0579			X		X																						
0580																											
0581			X		X																						
0582																											

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
[illegible] 2 March 1987 (09:30)	[illegible] 3-2-87 (0930)			

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

Shipment to: IEA Labs, Cary, NC

Method of Shipment:
RTI Project Name: SJAFB
Contract Number:

RTI Project Number: 2676-16

Note: Please return completed form to: Steve Winters
R.T.I.

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Remarks
✓ 0583	MW-45, 8' A1	LF4	Water	L	SB/LW	26Feb. 87 11:00	40 mL (A)	4°C	AVOCs
✓ 0584	MW-45, 8' A2	↓	↓	↓	↓	↓	↓	↓	HVOCs
✓ 0823	MW-45, 8' B1	↓	↓	↓	↓	↓	↓	↓	Save for positive confirmations
✓ 0824	MW-45, 8' B2	↓	↓	↓	↓	↓	↓	↓	"
✓ 0585	MW-46, 8' A1	↓	↓	↓	↓	26 Feb 87 10:00	↓	↓	AVOCs
✓ 0586	MW-46, 8' A2	↓	↓	↓	↓	↓	↓	↓	AVOCs
✓ 0825	MW-46, 8' B1	↓	↓	↓	↓	↓	↓	↓	Save for positive confirmations
✓ 0826	MW-46, 8' B2	↓	↓	↓	↓	↓	↓	↓	"

Analyses

Sticker	E601.1 (Pur.HC, water)	SW3550/E610.1 (Pur.HC, soil)	SW5030/SW8020 (A.V.O.C., water)	SW3550/SW8020 (A.V.O.C., soil)	E601 (H.V.O.C., water)	SW5030/SW8010 (H.V.O.C., soil)	E239.2 (Lead)	E200.7 (13 P.P.Met., water)	E206.2	E245.1	E270.2	SW3050/SW7060 (13 P.P.Met., soil)	SW3050/SW6010	SW7471	SW3050/SW7740	E625 (Extract., water)	SW3550/SW8270 (Extract., soil)	E160.1 (T.D.S.)	A429 (Anions)	A4720 (Tot.CN, water/soil)	A4?? (TKN)	SW3030/SW8010 (Tot.X.S., soil)	SW5030/SW8015 (Non-H.V.O.C., water/soil)	SW1310 (EPA Tox., soil)
0583			X																					
0584					X																			
0823																								
0824																								
0585			X																					
0586					X																			
0825																								
0826																								

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters, 2 March '87 (09:30)	[signature] 3-2-87 (0930)			

I-43

page 3 of 3

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

Shipment to: IEA Labs, Cary, NC

Method of Shipment:
RTI Project Name: SJAFB
RTI Project Number: 2676-16
Contract Number:

Note: Please return completed form to: Steve Winters R.T.I.

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses	Remarks
✓ 0587	MW-49 8.5' A1	LF4	Water	L	SH/CW	26 Feb. 87 12:30	40 mL (G)	4°C	X SW5030/SW8020 (A.V.O.C., water)	AVOCs
✓ 0588	MW-49 8.5' A2	↓	↓	↓	↓	↓	↓	↓	X E601 (H.V.O.C., water)	HVOCs
✓ 0827	MW-49 8.5' B1	↓	↓	↓	↓	↓	↓	↓		Save for positive confirmations
✓ 0828	MW-49 8.5' B2	↓	↓	↓	↓	↓	"	↓		"
✓ 0589	MW-13 22' A1	↓	↓	↓	↓	↓	↓	↓	X SW5030/SW8020 (A.V.O.C., water)	AVOCs
✓ 0590	MW-13 22' A2	↓	↓	↓	↓	↓	↓	↓	X E601 (H.V.O.C., water)	HVOCs
✓ 0836	MW-13 22' B1	↓	↓	↓	↓	↓	↓	↓		Save for positive confirmations
✓ 0837	MW-13 22' B2	↓	↓	↓	↓	↓	↓	↓		"

I-44

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters 2 March '87 (0930)	[signature] 0930 3-2-87			

Shipment to: R.T.I. Environmental Chemistry Dept.

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

page 1 of 1

Method of Shipment:
RTI Project Name: SJAEB
Contract Number:

All Project Number: 2633-16

Note: Please return completed form to: Steve Winters
R.T.I. Hydrogeology

NOTE 2 wk holding time

Sticker	Sample ID	Sampling Location	Sample Medium	Expected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses	Remarks
0545	MW-54, 15' K1	DPDO	water	L→M	SG/AW	2 March 87 15:00	1 L (P)	4°C	X	Alkalinity unfiltered
0567	MW-61, 15' K1	LF6				2 March 87 15:30			X	
~~0563~~ 0545	SW-13, A9	DPDO				2 March 87 12:15			X	
0564	SW-12, A9					2 March 87 11:30			X	

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
Steve Winters 3 March 87 (10:30)	[signature] 3/3/87 10:30			

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

Shipment to: IEA Labs, Cary, NC

page 1 of 1

Method of Shipment:
RTI Project Name: 53AF13
Contract Number:
RTI Project Number: 2636-16

Note: Please return completed form to: Steve Winters R.T.I.

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses	Remarks
0077	MW-54 15' A1	DPDO	water	L→M	SG/CW	2 March 87 1500	40 mL (G)	4°C	X	AVOCs
0078	MW-54 15' A2	↓	↓	↓	↓	↓	↓	↓	X	HVOCs
0539	MW-54 15' A3	↓	↓	↓	↓	↓	↓	↓		Save for 2nd column positive confirmations
0540	MW-54 15' A4	↓	↓	↓	↓	↓	↓	↓		"
0547	SW-13 A1	↓	↓	↓	↓	2 March 87 1215	↓	↓	X	AVOCs
0548	SW-13 A2	↓	↓	↓	↓	↓	↓	↓	X	HVOCs
0549	SW-13 A3	↓	↓	↓	↓	↓	↓	↓		Save for 2nd column positive confirmations
0550	SW-13 A4	↓	↓	↓	↓	↓	↓	↓		"

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
[signature]	Stewart Scott	GOOD	3-3-87 10:45 am	

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

page 1 of 1

Shipment to: EA Labs, Cary NC

Method of Shipment:
RTI Project Name: SUAEB
RTI Project Number: 2676-16
Contract Number:

Note: Please return completed form to: Steve Winters RTI.

Sticker	Sample ID	Sampling Location	Sample Media	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analysis	Analysis	Remarks
0069	MW-51, 8' A1	LF3	Water	L	[illegible]/CW	3/5/87 [illegible]	40 mL (G)	4°C	X		AVOCs
0070	MW-51, 8' A2	↓	↓	↓	↓	3/5/87 (13:00)	↓	↓		X	HVOCs
0071	MW-51, 8' A3	↓	↓	↓	↓	3/5/87 (13:00)	↓	↓			Save for 2nd Column positive Confirmations
0072	MW-51, 8' A4	↓	↓	↓	↓	3/5/87 (13:00)	"	↓			"
0073	MW-52, 7' A1	↓	↓	↓	↓	3/5/87 (13:00)	↓	↓	X		AVOCs
0074	MW-52, 7' A2	↓	↓	↓	↓	3/5/87 (13:00)	↓	↓		X	HVOCs
0075	MW-52, 7' A3	↓	↓	↓	↓	3/5/87 (13:00)	↓	↓			Save for 2nd Column positive confirmations
0076	MW-52, 7' A4	↓	↓	↓	↓	3/5/87 (13:00)	↓	↓			"

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
[illegible signature]	[illegible signature]	Good	3/5/87	

SECTION I-4

APRIL SAMPLING

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

page 1 of 1

Shipment to: RTI

Method of Shipment: Delivered by Sampler
RTI Project Name: 3JAEB
RTI Project Number: 2676-16
Contract Number: [illegible]

Note: Please return completed form to:

Sticker	Sample ID	Sampling Location	Sample Media	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses	Remarks
0569	SB-55,(0-2')D	DPDO	Soil		SG	13 APRIL 87 1530			X	
0571	SB-56,(0-2')D	DPDO	Soil		SG	13 APRIL 87 1430			X	
0573	SB-57,(0-2')D	DPDO	Soil		SG	13 APRIL 87 1300			X	
0753	SB-55,(9-11')D	DPDO	Soil		SG	13 APRIL 87 1600			X	
0755	SB-55,(3-5')D	DPDO	Soil		SG	13 APRIL 87 1530			X	
0756	SB 56,(3-5')D	DPDO	Soil		SG	13 APRIL 87 1430			X	

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
[signature]	Ezra D. Estes	good	4/13/87/2100	

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

page 1 of 1

Shipment to: IEA, Cary, NC.

Method of Shipment: Delivered by Sampler
RTI Project Name: SJAFB
RTI Project Number: 2676-16
Contract Number:

Note: Please return completed form to: Steve Winters
RTI

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses: SW5030/SW8020 (A.V.O.C., soil)	Analyses: SW3550/SW8270 (Extract., soil)	Remarks
0568	SB-55, 0-2' B	DPDO	soil		SG	13 APRIL 87 1530		ICED		X	
0752	SB-55, 3-5' B	DPDO	soil		SG	13 APRIL 87 1530		"	X	X	requires 2nd col. if positive
0754	SB-55, 9-11' B	DPDO	soil		SG	13 April 87 1600		"	X	X	requires 2nd col. if positive
0570	SB-56, 0-2' B	DPDO	soil		SG	13 APRIL 87 1430	"	"		X	
0572	SB-57, 0-2' B	DPDO	soil		SG	13 APRIL 87 1300		"	X	X	requires 2nd col. if positive

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
[signature]	[signature]	good	4/14 [illegible]	

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

page 2 of 2

Shipment to: [illegible]

Method of Shipment: Delivery by Sampler
RTI Project Name: [illegible]
RTI Project Number: 2676-11
Contract Number:

Note: Please return completed form to:

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses: E625 (Extract, water)	Remarks
0672	MW-14(14')E1	LANDFILL 4	H_2O		SG/RP	14 April 87 1600	GLASS/1L	@ 4°C	X	
0673	MW-14(14')E2	LANDFILL 4	H_2O		SG/RP	14 April 87 1600	GLASS/1L	@ 4°C	X	
0736	SW-10(6.5')E1	LANDFILL 4	H_2O		SG/RP	14 April 87 11:30	GL/1L	@ 4°C	X	
0737	SW-10(6.5')E2	LANDFILL 4	H_2O		SG/RP	14 April 87 1630	GL/1L	@ 4°C	X	
0740	SW 11 E1	LANDFILL 4	H_2O		SG/RP	14 April 87 1700	GL/1L	@ 4°C	X	
0741	SW 11 E2	LANDFILL 4	H_2O		SG/RP	14 April 87 1700	GL/1L	@ 4°C	X	

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
[signature]	[signature]	good	4/14/87 19:00	

I-51

CHAIN OF COSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

page 1 of 2

Method of Shipment: [illegible]
RTI Project Name: [illegible]   RTI Project Number: [illegible]
Contract Number:

Note: Please return completed form to:

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses: E625 (Extract, water)	Remarks
0709	MW 50, 15' E1	LANDFILL 3	H_2O		SG/RP	14 APR 87 900	1L	4°C CED	X	
0710	MW 50, 15' E2	LANDFILL 3	H_2O		SG/RP	14 April 87 900	1L	@4°C	X	
0660	MW 04, 10' E1	LANDFILL 4D	H_2O		SG/RP	14 April 87 1200	1L	@4°C	X	
0661	MW 04, 10' E2	LANDFILL 4D	H_2O		SG/RP	14 April 87 1200	1L	@4°C	X	
0680	MW 43, 15' E3	LANDFILL 4	H_2O		SG/RP	14 April 87 1200	1L	@4°C	X	
0681	MW 43, 18' E4	LANDFILL 4	H_2O		SG/RP	14 April 87 1200	1L	@4°C	X	
0664	MW 12, 16' E1	LANDFILL 1	H_2O		SG/RP	14 April 87 1400	1L	@4°C	X	
0665	MW 12, 16' E2	LANDFILL 1	H_2O		SG/RP	14 April 87 1400	1L	@4°C	X	

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
[signature]	[signature]	good	4/14/87 19:00	

CHAIN OF CUSTODY

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

Shipment to:

Method of Shipment: [illegible]
RTI Project Name: [illegible]
Contract Number:
RTI Project Number: 2676-16

Note: Please return completed form to:

Analyses: E418.1 (Pet.HC, water); SW3550/E418.1 (Pet.HC, soil); SW5030/SW8020 (A.V.O.C., water); SW5030/SW8020 (A.V.O.C., soil); E601 (H.V.O.C., water); SW5030/SW8010 (H.V.O.C., soil); E239.2 (Lead); E200.7, E206.2, E243.1, E270.2 (13 P.P.Met., water); SW3050/SW7060, SW3050/SW6010, SW7471, SW3050/SW7740 (13 P.P.Met., soil); E625 (Extract., water); SW3550/SW8270 (Extract., soil); E160.1 (T.D.S.); A429 (Anions); A412D (Tot.CN, water/soil); A403 (Alk.); SW5030/SW8010 (Tot.H.S., soil); SW5030/SW8015 (Non-H.V.O.C., water/soil); SW1310 (EPA Tox., soil)

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container type/vol.	Preservation	A429 (Anions)	Remarks
0662	MW-09(14') K	LANDFILL 4	H_2O		SG/RP	14 April 87 1600	PLASTIC 500 ml	H_2SO_4 @ 4°C	X	NO_3 (pH < 1.5)
0663	MW-09(14') L	LANDFILL 4	H_2O		SG/RP	14 April 87 1600	PL/1L	@ 4°C	X	NO_2, PO_4
0674	MW-14(14') J	LANDFILL 4	H_2O		SG/RP	14 April 87 1600	PL/500 ml	H_2SO_4 @ 4°C	X	NO_3 (pH < 1.5)
0677	MW-14(14') M	LANDFILL 4	H_2O		SG/RP	14 April 87 1600	PL/1L	@ 4°C	X	NO_2, PO_4
0738	SW-10 (0.5') J	LANDFILL 4	H_2O		SG/RP	14 April 87 1630	PL/500 ml	H_2SO_4 @ 4°C	X	NO_3 (pH < 1.5)
0739	SW-10 (0.5') K	LANDFILL 4	H_2O		SG/RP	14 April 87 1630	PL/1L	@ 4°C	X	NO_2, PO_4
0742	SW-11 J	LANDFILL 4	H_2O		SG/RP	14 April 87 1700	PL/500 ml	H_2SO_4 @ 4°C	X	NO_3 (pH < 1.5)
0743	SW-11 K	LANDFILL 4	H_2O		SG/RP	14 April 87 1700	PL/1L	@ 4°C	X	NO_2, PO_4

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
[illegible signature]	Eva Estes	good	4/14/87 / 2100	

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page 1 of 1

Shipment to: ?

Method of Shipment: by Sample
RTI Project Name: SWAC3
RTI Project Number: Z676-16
Contract Number:

Note: Please return completed form to:

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses: E418.1 (Pet.HC.,water)	SW3550/E418.1 (Pet.HC.,soil)	SW5030/SW8020 (A.V.O.C.,water)	SW5030/SW8020 (A.V.O.C.,soil)	E601 (H.V.O.C.,water)	SW5030/SW8010 (H.V.O.C.,soil)	E239.2 (Lead)	E200.7 (13 P.P.Met.,water)	E206.2	E245.1	E270.2	SW3050/SW7060 (13 P.P.Met.,soil)	SW3050/SW6010	SW7471	SW3050/SW7740	E625 (Extract.,water)	SW3550/SW8270 (Extract.,soil)	E160.1 (T.D.S.)	A429 (Anions)	A412D (Tot.CN,water/soil)	A403 (Alk.)	SW3050/SW6010 (Tot.M.S.,soil)	SW5030/SW8015 (Non-H.V.O.C.,water/soil)	SW1310 (EPA Tox.,soil)	Remarks
0766	MW 65 K	OL Field	H_2O		SG/RP	15 April 87 1200	Poly/1L	@4°C																			X						NO_2, PO_4
0721	MW 52(5') J	LANDFILL 3	H_2O		RP	15 April 87 1000	Poly/500ml	H_2SO_4 @4°C																			X						NO_3 (pH~1.8)
0722	MW 52 (5') K	LANDFILL 3	H_2O		RP	15 April 87 1000	Poly/1L	@4°C																			X						NO_2, PO_4
0718	MW 51 (5.5') M	LANDFILL 3	H_2O		SG	15 April 87 1100	Poly/1L	@4°C																			X						NO_2, PO_4
0716	MW 51 (5.5') K	LANDFILL 3	H_2O		SG	15 APRIL 87 1100	Poly/500ml	H_2SO_4 @4°C																			X						NO_3 (pH~1.58)
0768	MW 64 (5.5') J	LANDFILL 3	H_2O		SG	15 April 87 1100	Poly/500ml	H_2SO_4 @4°C																			X						NO_3 (1.76 pH)
0769	MW 64 (5.5') L	LANDFILL 3	H_2O		SG	15 April 87 1100	Poly/1L	@4°C																			X						NO_2 & PO_4
0725	MW 55 (5') J	LANDFILL 3	H_2O		SG/RP	15 April 87 1300	Poly/500ml	H_2SO_4 @4°C																			X						NO_3
0726	MW 53 (5') K	LANDFILL 3	H_2O		SG/RP	15 APRIL 87 1300	Poly/1L	@4°C																			X						NO_2, PO_4

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[signature]	~~[signature]~~	~~Good~~	~~15 APRIL 87 5:20~~	
[signature]	Eva Estes	Good	4/15/87/2100	

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Method of Shipment:
RTI Project Name:
Contract Number:
RTI Project Number:

Note: Please return completed form to:

Sticker No.	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses (Anions)	Remarks
0712	[illegible]	LANDFILL 3	H_2O		SG/RP	14 April 87 900	1L	@4°C	X	NO_2, PO_4
0711	[illegible]	LANDFILL 3	H_2O		SG/RP	14 April 87 900	500ml	H_2SO_4	X	NO_3 (pH<1.5)
	~~MW 4D~~	~~LANDFILL 4D~~	~~H_2O~~		SG/RP	14 April 87 1200	~~1L~~	~~@4°C~~		ERROR
	~~MW 4D~~	~~LANDFILL 4D~~	~~H_2O~~		SG/RP	14 April 87 1200	~~1L~~	~~@4°C~~		ERROR
0683	MW 43,13',K	LANDFILL 4	H_2O		SG/RP	14 April 87 1200	1L	@4°C	X	NO_2, PO_4
0682	MW 43,13',J	LANDFILL 4	H_2O		SG/RP	14 April 87 1200	500ml	H_2SO_4/@4°C	X	NO_3 (pH 1.3)
0666	MW 12,4',K	LANDFILL 1	H_2O		SG/RP	14 April 87 1400	500ml	H_2SO_4/@4°C	X	NO_3 (pH<1)
0667	MW 12,4',L	LANDFILL 1	H_2O		SG/RP	14 April 87 1400	1L	@4°C	X	NO_2, PO_4

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[illegible signature]	Eva Estes	good	4/14/87/2100	

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Shipment to: [illegible]

Method of Shipment: By Sampler
RTI Project Name: SWAFC
Contract Number:
RTI Project Number: Z276-16

Note: Please return completed form to:

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container type/vol.	Preservation	Analyses	Remarks
0732	MW56 E1	BL FIELD	H_2O		SG/RP	15 April 87 1200	GL/1L	@4°C	X	
0719	MW 52(5') E1	LANDFILL 3	H_2O		RP	15 April 87 1000	GL/1L	@4°C	X	
0720	MW 52(5') E2	LANDFILL 3	H_2O		RP	15 April 87 1000	GL/1L	@4°C	X	
0714	MW 51(5.5') E2	LANDFILL 3	H_2O		SG	15 April 87 1100	GL/1L	@4°C	X	
0713	MW51(5.5') E1	LANDFILL 3	H_2O		SG	15 April 87 1100	GL/1L	@4°C	X	
0723	MW 53 (5') E1	LANDFILL 3	H_2O		SG/RP	15 April 87 1300	GL/1L	@4°C	X	
0724	MW 53 (5') E2	LANDFILL 3	H_2O		SG/RP	15 April 87 1300	GL/1L	@4°C	X	

No 2nd extract. Pest ref.

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[signature]	[signature]	Good	4/15/87 530	

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Shipment to: ICA

Method of Shipment: by [illegible]
RTI Project Name: [illegible]
Contract Number:
RTI Project Number: [illegible]

Note: Please return completed form to:

Analyses: E418.1 (Pet.HC, water); SW3550/E418.1 (Pet.HC, soil); SW5030/SW8020 (A.V.O.C., water); SW5030/SW8020 (A.V.O.C., soil); E601 (H.V.O.C., water); SW5030/SW8010 (H.V.O.C., soil); E239.2 (Lead); E200.7, E206.2, E245.1, E270.2 (13 P.P.Met., water); SW3050/SW7060, SW3050/SW7010, SW7471, SW3050/SW7740 (13 P.P.Met., soil); E625 (Extract, water); SW3550/SW8270 (Extract, soil); E160.1 (T.D.S.); A429 (Anions); A4120 (Tot.CN, water/soil); A403 (Alk.); SW5030/SW8010 (Tot.H.S., soil); SW5030/SW8015 (Non-H.V.O.C., water/soil); SW1310 (EPA Tox., soil)

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	E625 (Extract, water)	Remarks
0696	MW 47(55)E1	LANDFILL 4	H_2O	M-L	SG/RTP	16 April 87 1000	GL/1L	@4°C	X	
0697	MW 47(55)E2	LANDFILL 4	H_2O	M-L	SG/RTP	16 April 87 1000	GL/1L	@4°C	X	
0688	MW 45(55')E1	LANDFILL 4	H_2O	M-L	SG/~~RTP~~	16 April 87 1000	GL/1L	@4°C	X	
0689	MW 45(55')E2	LANDFILL 4	H_2O	M-L	SG/~~RTP~~	16 April 87 1000	GL/1L	@4°C	X	
0684	MW 44 55') E1	LANDFILL 4	H_2O	M-L	SG/RTP	16 April 87 1200	GL/1L	@4°C	X	
0685	MW 44(55') E2	LANDFILL 4	H_2O	M-L	SG/RTP	16 April 87 1200	GL/1L	@4°C	X	
0692	MW 46(5') E1	LANDFILL 4	H_2O	M-L	SG	16 April 87 1200	GL/1L	@4°C	X	
0693	MW 46(5') E2	LANDFILL 4	H_2O	M-L	SG	16 April 87 1200	GL/1L	@4°C	X	

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[illegible]	[illegible]	[illegible]	16 April 87/5[illegible]	

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page 1 of 1

Method of Shipment: [illegible]
RTI Project Name: [illegible]
Contract Number:
RTI Project Number: [illegible]

Note: Please return completed form to:

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses	Remarks
0699	MW47(5.5') K	LANDFILL 4	H_2O	M-L	SG/RP	16 April 87 1000	PL/1L	@4°C	Y	NO_2, PO4
0698	MW47(5.5') J	LANDFILL 4	H_2O	M-L	SG/RP	16 April 87 1000	PL/500ml	~~H_2SO_4~~ @4°C	Y	NO_3
0690	MW45(5.5') J	LANDFILL 4	H_2O	M-L	SG/RP	16 April 87 1000	PL/500ml	~~H_2SO_4~~ @4°C	X	NO_3
0691	MW45(5.5') K	LANDFILL 4	H_2O	M-L	SG/RP	16 April 87 1000	PL/1L	@4°C	X	NO_2, PO4
0686	MW44(5.5') J	LANDFILL 4	H_2O	M-L	RP	16 April 87 1200	PL/500ml	@4°C	X	NO_3
0687	MW44(5.5') K	LANDFILL 4	H_2O	M-L	RT	16 April 87 1200	PL/1000ml	@4°C	X	NO_2, PO4
0694	MW41(5') J	LANDFILL 4	H_2O	M-L	SG	16 April 87 1200	PL/500ml	@4°C	\	NO_3
0695	MW41(5') K	LANDFILL 4	H_2O	M-L	SG	16 April 87 1200	PL/1L	@4°C	\	NO_2, PO4

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Eva Estes	Good	April 16, 1987/1600	

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Shipment to: IEA

page 1 of 1

Method of Shipment: by Sampler
RTI Project Name: SWAEB
Contract Number:
RTI Project Number: 2676-16

Note: Please return completed form to:

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses: E625 (Extract., water)	Remarks
0700	MW 48(6')E1	LANDFILL 4	H_2O	L-M	SG	22 April 87 1100	GL/1L	@4°C	X	
0701	MW 48(6')E2	LANDFILL 4	H_2O	L-M	SG	22 April 87 1100	GL/1L	@4°C	X	
0706	MW 49(6')E3	LANDFILL 4	H_2O	L-M	RP	22 April 87 1100	GL/1L	@4°C	X	
0707	MW 49(6')E4	LANDFILL 4	H_2O	L-M	RP	22 April 87 1100	GL/1L	@4°C	X	
0735	MW ~~49~~ 57(6')E1d	LANDFILL 4	H_2O	L-M	RP/SG	22 April 87 1100	GL/1L	@4°C	X	
0771	MW 57(6')E2d	LANDFILL 4	H_2O	L-M	RP/SG	22 April 87 1100	GL/1L	@4°C	X	
0669	MW 13(21')E2	LANDFILL 4	H_2O	L-M	RP	22 April 87 1200	GL/1L	@4°C	X	
0668	MW 13(21')E1	LANDFILL 4	H_2O	L-M	RP	22 April 87 1200	GL/1L	@4°C	X	
0733	MW ~~13 (4')~~ 56 (9')(E) E1	BL FIELD	H_2O	L-M	SG/RP	22 April 87 1300	GL/1L	@4°C	X	BASE NEUTRAL
0727	MW 54(9')G1	DPDO	H_2O	L-M	RP	22 April 87 1400	GL/1L	@4°C	X	
0728	MW 54(9')E2	DPDO	H_2O	L-M	RP	22 April 87 1400	GL/1L	@4°C	X	

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Scott A. [illegible]	[illegible signature]	Good	22 April 1987 16:30	

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page 1 of 2

Shipment to: R.T.I.

Method of Shipment: by sampler
RTI Project Name: SJAFB
Contract Number:
RTI Project Number: 2671-11

Note: Please return completed form to:

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container type/vol.	Preservation	Analyses (Anions)	Remarks
0702	MW 48(6') J	LANDFILL 4	H_2O	L-M	SG	22April87 1100	SG PL/500ml	@4°C	Y	NO_3
0703	MW 48(6') K	LANDFILL 4	H_2O	L-M	SG	22April87 1100	PL/1L	@4°C	X	NO_2, PO_4
0708	MW 49(6') J	LANDFILL 4	H_2O	L-M	RP	22April87 1100	PL/500ml	@4°C	X	NO_3
0770	MW 49(6') K	LANDFILL 4	H_2O	L-M	RP.	22April87 1100	PL/1L	@4°C	X	NO_2, PO_4
0670	MW 13(21') J	LANDFILL 4	H_2O	L-M	RP.	22April87 1200	PL/500ml	@4°C	X	NO_3
0671	MW 13(21') K	LANDFILL 4	H_2O	L-M	RP	22April87 1200	PL/1L	@4°C	X	NO_2, PO_4
0734	MW 62(11') EI	BL FIELD	H_2O	L-M	SG/RP	22April87 1300	PL/1L	NaOH (12.40) @4°C	X	CN^-
0765	MW 63(11') J	BL FIELD	H_2O	L-M	SG/RP	22April87 1300	PL/500ml	@4°C	X	NO_3
0729	MW 54(9') J	DPDO	H_2O	L-M	RP	22April87 1400	PL/500ml	@4°C	X	NO_3
0730	MW 54(9') K	DPDO	H_2O	L-M	RP	22April87 1400	PL/1L	@4°C	X	NO_2, PO_4
0748	SW 13(sc) J	DPDO(dh)	H_2O	L-M	RP/SC	22April87 1430	PL/500ml	@4°C	X	NO_3
0749	SW 13(sc) K	DPDO(dh)	H_2O	L-M	RP/SC	22April87 1430	PL/1L	@4°C	X	NO_2, PO_4

Relinquished by (signature)	Received by (signature)	Condition	Date/Time	Comments
[signature]	[signature]	Good	22 April 87 1835	
[signature]	Eva D. Estes	Good	23 April 87 0745	

page 2 of 2

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Method of Shipment: by Sampler
RTI Project Name: SDAFTC
Contract Number:
RTI Project Number: 2676-16

Note: Please return completed form to:

Sticker	Sample ID	Sampling Location	Sample Medium	Suspected Sample Conc. (H,M,L)	Sampler(s)	Date/Time	Container Type/Vol.	Preservation	Analyses: (Anions)	Analyses: (Tot. CN, water/soil)	Remarks
0744	SW12 J	DPDO	H_2O	L-M	SE/LP	22 April 87 1530	PL/500ml	@4°C	X		NO_3
0745	SW12 K	DPDC	H_2O	L-M	SE/RP	22 April 87 1530	PL/1L	@4°C	X		NO_2, PO_4
0731	MW54 (9') L	DPDO	H_2O	L-M	SG/RP	22 April 87 1400	PL/1L	NaOH @4°C		X	CN^- TOTAL
0746	SW12 (up) R1	DPDO	H_2O	L-M	SE/RP	22 April 87 1530	PL/1L	NaOH @4°C		X	CN^- TOTAL
0750	SW13 (dn) N	DPDO	H_2O	L-M	SE/RP	22 April 87 1430	PL/1L	NaOH @4°C		X	CN^- TOTAL
0751	SW20 (up) O	DPDO	H_2O	L-M	SE/LP	22 April 87 1530	PL/1L	NaOH @4°C		X	CN^- TOTAL
0607	SB57 (13-15') D	DPDO	soil	L-M	SE	22 April 87 1500	GL/MASON	@4°C		X	CN^- TOTAL
0757	SB56 (8'-10') D	DPDO	soil	L-M	SG	22 April 87 1500	GL/MASON	@4°C		X	CN^- TOTAL
0763	SD14 (up) C	DPDO	sediment	L-M	SE/RP	22 April 87 1530	GL/MASON	@4°C		X	CN^- TOTAL
0764	SD15 (dn) C	DPDO	sediment	L-M	SE/RP	22 April 87 1530	GL/MASON	@4°C		X	CN^- TOTAL

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[signature]	Ervin D. Estes	Good	23 April 87 0745	

APPENDIX J

ANALYTICAL DATA AND PROCEDURES UTILIZED IN WATER AND SOIL SAMPLE ANALYSES

APPENDIX J - LABORATORY QA/QC DATA

J-1 INTRODUCTION

The detailed results of the field sampling quality assurance (QA) procedures and quality control (QC) data are provided in Section 4.8 of the report. This Appendix summarizes the laboratory QA/QC data for valid analytical results. Two separate laboratories performed the analyses required for this project. The inorganic analyses were performed by RTI's Environmental Chemistry Department. The organic analyses were performed under subcontract to RTI by Industrial and Environmental Analysts, Inc. (IEA) in Research Triangle Park, NC. The QA/QC programs for both laboratories are described herein along with detailed QA/QC data for each method of analysis.

The laboratory QC data specifically included second-column confirmation, laboratory duplicates, laboratory spikes, and laboratory surrogates. Analysis of the laboratory QC data, as well as the field QC data previously described in Section 4.8, allows the precision of the entire measurement system, including sampling error, to be estimated by comparing the results of duplicate analyses. Where duplicate values are available, the relative percent difference (RPD) of the values was determined as follows:

$$RPD = x_1 - x_2/((x_1 + x_2)/2) \bullet 100\%$$

where x_1 and x_2 are paired duplicate values. In addition analyses of QA reference materials, surrogates and spiked sample allow an estimate of overall accuracy. The following subsections discuss the results of the laboratory QA/QC data along with other pertinent laboratory information within the general categories of inorganic and organic analyses.

J-2 LABORATORY QA/QC DATA FOR INORGANIC ANALYSES

The inorganic analyses were performed within the Center for Environmental Measurements (CEM) of RTI. The CEM is certified by the American Industrial Hygiene Association for trace metal analysis and has performed numerous quality assurance activities for the EPA, including systems and performance audits, evaluation of sampling and analysis methods, and development of quality assurance materials. A quality assurance manual has been developed for the Center and is followed. QA/QC activities in the area of inorganic analysis include the following:

- Instrument maintenance
- Preparation of ultra-clean glassware and other apparatus
- Use of fresh and appropriately pure reagents
- Use of appropriate sample preparation procedures; e.g., appropriate acid digestion procedure for a particular metal or group of metals
- Regular instrument calibration and check of calibration linearity
- Recalibration and preparation of fresh standard solutions as necessary
- Analysis of blanks, duplicates, and spikes
- Analysis of quality assurance samples acquired from the NBS and EPA

J-2.1 <u>Trace Metal Analysis</u>

Trace metal analysis was performed using atomic absorption spectrophotometry, inductively coupled argon plasma emission spectrometry, and cold vapor atomic absorption spectrophotometry (for mercury). The first concern was to use the appropriate digestion techniques. Digestion techniques used are those recommended by EPA for soil and water samples.

Multipoint calibrations of the instruments were performed at the beginning of each analytical session. A single point calibration check was made after every ten samples and a full multipoint recalibration was performed if the calibration varied by more than ten percent. Duplicates and spikes were run on approximately ten percent of the samples.

J-2.1.1 Priority Pollutants in Soil--Laboratory duplicates for priority pollutants in soil are presented in Table J-1A. Except for copper and arsenic in SD-13, agreement is within about 20 percent. The results of QA reference samples are presented in Table J-1B. As noted, the found and expected results agree well at these low levels. Only beryllium and chromium appear significantly low in MESS-1. The results of analysis of spiked soil samples are shown in Table J-1C. As noted, all percent recoveries are very good except for antimony.

TABLE J-1A. SUMMARY OF LABORATORY QA/QC DATA (DUPLICATES) FOR PRIORITY POLLUTANTS (SOIL); p. 1 of 1

SAMPLING POINT:		SB-56	1) SB-56		SD-13	2) SD-13	
STICKER NO., ID:		30,D	-		358,C	-	
APPENDIX TABLE, PAGE:		S-7,2		RPD	M-5,1		RPD
SPECIES	DETECTION LIMIT (mg/Kg)						
Iron	4.50	10400	10600	1.9%	---	---	
Aluminum	---	7060	7090	0.4%	---	---	
Antimony	6.00	BDL	8.22		BDL	BDL	
Lead	6.30	BDL	BDL		108	123	13.0%
Nickel	3.00	BDL	BDL		13.00	11.30	14.0%
Copper	2.80	BDL	BDL		6.35	9.05	35.1%
Zinc	0.60	BDL	BDL		104	113	8.3%
Beryllium	0.12	0.25	BDL		0.298	0.295	1.0%
Silver	2.80	BDL	BDL		BDL	BDL	
Cadmium	0.34	BDL	BDL		BDL	BDL	
Chromium	2.10	BDL	BDL		6.05	6.30	4.0%
Thallium	0.20	BDL	BDL		BDL	BDL	
Arsenic	0.32	2.043	1.749	15.5%	1.29	2.08	46.9%
Selenium	0.22	0.347			0.99	0.80	21.2%
Mercury	0.10	BDL			0.246	0.245	0.4%

BDL = Below Detection Limits
RPD = Relative Percent Difference
1) = Laboratory Duplicate of 30,D
2) = Laboratory Duplicate of 358,C

TABLE J-1B. SUMMARY OF LABORATORY QA/QC DATA (QA CHECKS) FOR PRIORITY POLLUTANTS (SOIL); p. 1 of 2

SPECIES	QA CHECK SAMPLE (ug/ml) 1)			QA CHECK SAMPLE (ug/ml) 2)			QA CHECK SAMPLE (ug/g) 3)		
	EXPECTED	FOUND	RPD	EXPECTED	FOUND	RPD	EXPECTED	FOUND	RPD
Iron	0.788	0.75	4.9%				33900	24100	33.8%
Aluminum	0.746	0.74	0.8%				58300	18100	105.2%
Antimony				10.0	10.2	2.0%			
Lead	0.435	0.444	2.0%	2.0	2.17	8.2%	34.0	24.8	31.3%
Nickel	0.206	0.199	3.5%				29.5	22.9	25.2%
Copper	0.339	0.382	11.9%				25.1	21.4	15.9%
Zinc	0.418	0.569	30.6%				191	158	18.9%
Beryllium	0.232	0.232	0.0%				1.9	0.999	62.2%
Silver				1.0	0.994	0.6%			
Cadmium	0.039	0.04	2.5%	0.7	0.71	1.4%	0.59	BDL	
Chromium	0.261	0.29	10.5%	1.25	1.36	8.4%	71	2.64	185.7%
Thallium	25.2	24.3	3.6%						
Arsenic	49	50.2	2.4%				10.6	8.15	26.1%
Selenium	9.7	10.6	8.9%						
Mercury	0.1155	0.1188	2.8%				0.171	0.162	5.4%

BDL = Below Detection Limits
RPD = Relative Percent Difference
1) = Check samples consisted of WP481, WP581, 1643b and in-house QA sample
2) = Check samples consisted of WP283, and RTI5
3) = Check samples consisted of MESS-1

TABLE J-1B. SUMMARY OF LABORATORY QA/QC DATA (QA CHECKS) FOR PRIORITY POLLUTANTS (SOIL); p. 2 of 2

SPECIES	QA CHECK SAMPLE (ug/ml)			QA CHECK SAMPLE (ug/g) 1)		
	EXPECTED	FOUND	RPD	EXPECTED	FOUND	RPD
Iron						
Aluminum						
Antimony	1.0	0.99	1.0%			
Lead				34.0	27.5	21.1%
Nickel	0.207	0.222	7.0%	29.50	27.30	7.7%
Copper	0.339	0.351	3.5%	25.1	23.1	8.3%
Zinc	0.418	0.443	5.8%	191	163	15.8%
Beryllium	0.235	0.245	4.2%	1.9	0.794	82.1%
Silver	5.0	5.3	5.8%			
Cadmium	0.039	0.038	2.6%	0.59	0.40	38.4%
Chromium	0.261	0.255	2.3%	71	20.0	112.1%
Thallium	0.0252	0.0241	4.5%			
Arsenic	0.049	0.0496	1.2%	10.6	5.59	61.9%
Selenium	0.0097	0.0086	12.0%	0.4	0.43	7.2%
Mercury				0.171	0.177	3.4%

RPD = Relative Percent Difference

1) = Check sample consisted of MESS-1

TABLE J-1C. SUMMARY OF LABORATORY QA/QC DATA (QA SPIKES) FOR PRIORITY POLLUTANTS (SOIL); p. 1 of 1

SPECIES	QA CHECK SAMPLE (ug/g)			QA CHECK SAMPLE (ug/g)		
	EXPECTED	FOUND	PERCENT RECOVERY	EXPECTED	FOUND	PERCENT RECOVERY
Iron						
Aluminum						
Antimony	100	49.0	49.0%			
Lead	100	93.0	93.0%	249.0	254	102.0%
Nickel	100	89.2	89.2%	112.0	111.0	99.1%
Copper	100	89.1	89.1%	142	141	99.3%
Zinc	100	90.0	90.0%	384	393	102.3%
Beryllium	100	89.0	89.0%	98.8	99.6	100.8%
Silver	100	88.2	88.2%	115.0	93.3	81.1%
Cadmium	100	86.9	86.9%	112.0	108	96.4%
Chromium	100	88.0	88.0%	108	104.00	96.3%
Thallium				99.6	94.2	94.6%
Arsenic				99.6	81.6	81.9%
Selenium				99.6	108.0	108.4%
Mercury				0.49	0.485	99.0%

J-2.1.2 Total Metal Screen for Soil--Laboratory duplicates for the total metal screen of soils are presented in Table J-2A. As noted, the RPD is in the range of 5-10 percent for the majority of the metals. The majority of those showing an RPD greater than ten percent are near their detection limits. The results of the metal screen analyses of QA reference materials are presented in Table J-2B. The RPD's tend to be higher for this type of analysis, though they are generally below 50 percent for the environmentally significant metals. The results of samples spiked for total metal screen of soils are presented in Table J-2C. Percent recoveries here are excellent for three of the four samples. The vast majority of those in this third sample still show recoveries greater than 80 percent.

J-2.1.3 Priority Pollutants in Water--Duplicate sample analysis results for the priority pollutants in water are shown in Table J-3A. Limited results show reasonable reproducibility. Results of the analysis of QA check samples are presented in Table J-3B. The results are noted to be very good with the exception of the lead in the third sample. Finally, results for spiked priority pollutants in the water samples are presented in Table J-3C. Percent recoveries are noted to be excellent.

J.2.2 Trace Ion Analysis

Trace ion analysis was performed using ion chromatography. QA/QC activities included regular calibration, analysis of blanks, duplicates, and QA reference materials.

The calibration sequence is the same as that followed in the trace metal analysis. A blank was prepared and analyzed with each set of samples. About ten percent of the samples were done in duplicate. QA reference water samples from the EPA were analyzed with each batch of samples.

J-3 LABORATORY QA/QC DATA FOR ORGANIC ANALYSES

Analysis for organic materials was performed by IEA. This laboratory has been accepted into the EPA's Contract Laboratory Program (CLP), which has extremely stringent QC/QA requirements. The laboratory also has EPA and NC Drinking Water Laboratory Certification and is performing satisfactorily in the NIOSH Proficiency Testing Program.

TABLE J-2A. SUMMARY OF LABORATORY QA/QC DATA (DUPLICATES) FOR TOTAL METAL SCREEN (SOIL); p. 1 of 1

SPECIES	DETECTION LIMIT (ug/g)	1) SB-58			2) SB-60		
SAMPLING POINT:		SB-58	SB-58		SB-60	SB-60	
STICKER NO., ID:		7,A	-		5,A	-	
APPENDIX TABLE, PAGE:		U-1,1		RPD	U-1,3		RPD
Iron	4.5	2000	2090	4.4%	1190	1280	7.3%
Manganese	1.5	47.4	47.0	0.8%	3.0	3.98	28.1%
Vandium	0.6	7.5	7.2	4.1%	5.3	4.44	17.7%
Aluminum	---	4910	5180	5.4%	10200	10600	3.8%
Nickel	3.0	2.4	2.3	4.3%	2.7	BDL	
Cobalt	0.8	BDL	BDL		1.0	BDL	
Barium	1.0	17.5	18.8	7.2%	18.5	23.4	23.4%
Beryllium	0.12	0.18	0.2	10.5%	0.26	0.238	8.8%
Silver	2.8	BDL	BDL		BDL	4.54	
Copper	2.8	BDL	BDL		BDL	BDL	
Cadmium	0.34	BDL	BDL		BDL	BDL	
Chromium	2.1	3.6	3.4	5.7%	5.5	4.56	18.7%
Magnesium	12.0	205	210	2.4%	114	117	2.6%
Molybdenum	0.9	BDL	BDL		BDL	BDL	
Lead	6.3	BDL	BDL		15.7	16.8	6.8%
Zinc	0.6	4.6	2.0	78.8%	2.8	BDL	
Antimony	6.0	BDL	BDL		BDL	20	
Boron	2.4	6.0	8.0	28.6%	BDL	194	
Calcium	2.4	200	199	0.5%	BDL	32.7	
Silicon	7.0	802	896	11.1%	1480	436	109.0%
Sodium	12.0	60	40	40.0%	10	8.9	11.6%
Thallium	0.2	BDL	BDL		BDL	BDL	
Potassium	0.5	170	177	4.0%	124	121	2.4%

BDL = Below Detection Limit
RPD = Relative Percent Difference
1) = Laboratory Duplicate of 7,A
2) = Laboratory Duplicate of 5,A

TABLE J-2B. SUMMARY OF LABORATORY QA/QC DATA (QA CHECKS) FOR TOTAL METAL SCREEN (SOIL); p. 1 of 1

SPECIES	QA CHECK SAMPLE (ug/g)			QA CHECK SAMPLE (ug/ml)			QA CHECK SAMPLE (ug/g)		
	EXPECTED	FOUND	RPD	EXPECTED	FOUND	RPD	EXPECTED	FOUND	RPD
Iron				0.788	0.75	4.9%	33900	24100	33.8%
Manganese	513	315	47.8%	0.348	0.376	7.7%	513	337	41.4%
Vandium	72.4	41.4	54.5%	0.864	0.896	3.6%	72.4	76.4	5.4%
Aluminum	58348	16400	112.2%	0.746	0.74	0.8%	58300	18100	105.2%
Nickel	29.5	22.2	28.2%	0.206	0.199	3.5%	29.5	22.9	25.2%
Cobalt	10.8	9.6	11.8%	0.261	0.271	3.8%	10.8	10.5	2.8%
Barium									
Beryllium	1.9	1.07	55.9%	0.232	0.232	0.0%	1.9	0.999	62.2%
Silver									
Copper	25.1	20.7	19.2%	0.039	0.382	162.9%	25.1	21.4	15.9%
Cadmium	0.59	0.71	18.5%	0.039	0.040	2.5%	0.59	BDL	
Chromium	71	28.6	85.1%	0.261	0.290	10.5%	71	2.64	185.7%
Magnesium	8640	6290	31.5%				8680	7230	18.2%
Molybdenum									
Lead	34.0	24.2	33.7%	0.435	0.449	3.2%	34.0	24.8	31.3%
Zinc	191	150	24.0%	0.418	0.569	30.6%	191	158	18.9%
Antimony	0.73	6.98	162.1%						
Boron									
Calcium	4810	2140	76.8%				4820	2310	70.4%
Silicon	315000	748	199.1%				315000	666	199.2%
Sodium	18500	5900	103.3%						
Thallium	0.7	BDL							
Potassium	18600	3300	139.7%						

BDL = Below Detection Limit
RPD = Relative Percent Difference

TABLE J-2C. SUMMARY OF LABORATORY QA/QC DATA (QA SPIKES) FOR TOTAL METAL SCREEN (SOIL); p. 1 of 2

SPECIES	QA SPIKE (ug/ml)			QA SPIKE (ug/g)		
	EXPECTED	FOUND	PERCENT RECOVERY	EXPECTED	FOUND	PERCENT RECOVERY
Iron	10	10	100%			
Manganese	5.00	5.08	102%	147.0	144.6	98%
Vandium	5.00	4.96	99%	107.0	104.8	98%
Aluminum	5.00	4.50	90%			
Nickel	5.00	4.96	99%	102.0	100.4	98%
Cobalt	5.00	5.12	102%	100.0	99.2	99%
Barium	5.00	5.02	100%	108.0	116.5	108%
Beryllium				100.0	100.7	101%
Silver	5.00	4.88	98%	100.0	95.2	95%
Copper	5.00	4.97	99%	100.0	97.6	98%
Cadmium	5.00	4.98	99	100.0	94.3	94%
Chromium	5.00	5.18	104%	103.5	103.4	100%
Magnesium	5.00	5.26	105%	308.0	332.0	108%
Molybdenum				100.0	97.1	97%
Lead	5.00	5.30	106%	100.0	104.9	105%
Zinc	5.00	4.96	99%	103.0	100.0	97%
Antimony	10.00	10.05	101%	100.0	87.6	88%
Boron	5.00	5.29	106%	107.0	109.5	102%
Calcium	5.00	5.00	100%	300.0	299.0	100%
Silicon	5.00	5.00	100%	949.0	1095.0	115%
Sodium	10.00	10.00	100%	150.0	170.0	113%
Thallium	10.00	10.01	100%	100.0	91.6	92%
Potassium	0.400	0.435	109%	274.0	341.0	124%

TABLE J-2C. SUMMARY OF LABORATORY QA/QC DATA (QA SPIKES) FOR TOTAL METAL SCREEN (SOIL); p. 2 of 2

SPECIES	QA SPIKE (ug/g)			QA SPIKE (ug/ml)		
	EXPECTED	FOUND	PERCENT RECOVERY	EXPECTED	FOUND	PERCENT RECOVERY
Iron						
Manganese	104.0	91.3	88%			
Vandium	105.0	88.9	85%			
Aluminum						
Nickel	100.0	87.2	87%			
Cobalt	101.0	86.4	86%			
Barium	122.0	107.0	88%	1.00	1.02	102%
Beryllium	100.0	85.2	85%			
Silver	105.0	85.4	81%	1.00	0.994	99%
Copper	100.0	82.5	82			
Cadmium	100.0	81.5	81	0.70	0.71	101%
Chromium	105.0	86.4	82%	1.25	1.36	109%
Magnesium						
Molybdenum				10.00	10.30	103%
Lead	114.0	98.0	86%	2.00	2.17	109%
Zinc	100.0	86.3	86%			
Antimony	120.0	78.8	66%	10.00	10.20	102%
Boron	302.0	272.0	90%	5.00	5.02	100%
Calcium	131.0	121.0	92%	1.00	1.00	100%
Silicon	587.0	692.0	118%	5.00	4.90	98%
Sodium						
Thallium	100.0	44.7	45%			
Potassium	231.0	243.0	105%	0.086	0.085	99%

TABLE J-3A. SUMMARY OF LABORATORY QA/QC DATA (DUPLICATES) FOR PRIORITY POLLUTANTS (WATER); p. 1 of 2

COMPOUND	DETECTION LIMIT (ug/mL)		1)			2)			3)	
	SAMPLING POINT:	MW-45	MW-45		MW-12	MW-12		SW-10	SW-10	
	STICKER NO., ID:	355	-		333	-		434	-	
	APPENDIX TABLE, PAGE:	M-2,1		RPD	O-2,1		RPD	M-6,1		RPD
Arsenic	0.002	BDL			BDL			BDL	BDL	
Antimony	0.060	BDL	BDL		BDL			BDL		
Beryllium	0.0012	BDL			BDL	BDL		BDL		
Cadmium	0.006	BDL	BDL		BDL			BDL		
Chromium	0.008	BDL	BDL		BDL			BDL		
Copper	0.014	0.040			0.063	0.035	57.1%	BDL		
Lead	0.053	BDL	BDL		BDL			BDL		
Mercury	0.0002	BDL			BDL					
Nickel	0.010	BDL			BDL	BDL		BDL		
Selenium	0.004	BDL			BDL			BDL	BDL	
Silver	0.007	0.134			BDL			BDL	BDL	
Thallium	0.002	BDL			BDL			BDL		
Zinc	0.003	BDL			BDL	BDL		0.029		

BDL = Below Detection Limit
RPD = Relative Percent Difference
1) = Laboratory duplicate of 355
2) = Laboratory duplicate of 333
3) = Laboratory duplicate of 434

TABLE J-3A. SUMMARY OF LABORATORY QA/QC DATA (DUPLICATES) FOR PRIORITY POLLUTANTS (WATER); p. 2 of 2

	SAMPLING POINT:	MW-45	MW-45 1)	
	STICKER NO., ID:	464	-	
	APPENDIX TABLE, PAGE:	S-4,1		RPD
COMPOUND	DETECTION LIMIT (ug/mL)			
Arsenic	0.002	BDL		
Antimony	0.060	BDL	BDL	
Beryllium	0.0012	BDL	BDL	
Cadmium	0.006	0.008	0.010	22.2%
Chromium	0.008	BDL	BDL	
Copper	0.014	BDL	BDL	
Lead	0.053	0.100	0.101	1.0%
Mercury	0.0002	BDL		
Nickel	0.010	BDL	BDL	
Selenium	0.004	BDL		
Silver	0.007	0.116		
Thallium	0.002	BDL		
Zinc	0.003	BDL	0.004	

BDL = Below Detection Limit
RPD = Relative Percent Difference
1) = Laboratory duplicate of 464

TABLE J-3B. SUMMARY OF LABORATORY QA/QC DATA (QA CHECKS) FOR PRIORITY POLLUTANTS (WATER); p. 1 of 1

COMPOUND	QA CHECK SAMPLE (ug/ml)			QA CHECK SAMPLE (ug/ml) 1)			QA CHECK SAMPLE (ug/ml) 1)		
	EXPECTED	FOUND	RPD	EXPECTED	FOUND	RPD	EXPECTED	FOUND	RPD
Arsenic	0.049	0.052	5.9%	0.235	0.225	4.3%	0.235	0.225	4.3%
Antimony	10.0	9.83	1.7%						
Beryllium	0.235	0.246	4.6%	0.235	0.249	5.8%	0.235	0.245	4.2%
Cadmium				0.039	0.040	2.5%	0.039	0.038	2.6%
Chromium				0.261	0.252	3.5%	0.261	0.255	2.3%
Copper	0.339	0.364	7.1%	0.339	0.387	13.2%	0.339	0.351	3.5%
Lead				0.435	0.42	3.5%	0.435	0.271	46.5%
Mercury				4.62	4.79	3.6%	1.155	1.121	3.0%
Nickel	0.207	0.195	6.0%	0.207	0.182	12.9%	0.207	0.222	7.0%
Selenium	0.0097	0.0083	15.6%	0.050	0.048	4.1%	0.050	0.048	4.1%
Silver	1.000	0.795	22.8%						
Thallium	0.0252	0.0235	7.0%						
Zinc	0.418	0.444	6.0%	0.418	0.424	1.4%	0.418	0.443	5.8%

RPD = Relative Percent Difference

1) = Except for Mercury; expressed in ug/L

TABLE J-3C. SUMMARY OF LABORATORY QA/QC DATA (QA SPIKES) FOR PRIORITY POLLUTANTS (WATER); p. 1 of 1

COMPOUND	QA CHECK SPIKE (ug/mL) 1)			QA CHECK SPIKE (ug/mL) 1)		
	EXPECTED	FOUND	PERCENT RECOVERY	EXPECTED	FOUND	PERCENT RECOVERY
Arsenic	2.000	1.851	93%	2.000	2.034	102%
Antimony	2.000	0.589	29%	2.000	2.022	101%
Beryllium	2.000	2.086	104%	2.000	2.035	102%
Cadmium	2.000	2.056	103%	2.000	1.935	97%
Chromium	2.000	2.092	105%	2.000	1.906	95%
Copper	2.000	2.039	102%	2.000	1.906	95%
Lead	2.000	1.984	99%	2.000	1.807	90%
Mercury	1.000	0.870	87%			
Nickel	2.000	2.137	107%	2.000	2.077	104%
Selenium	2.000	2.079	104%	2.000	1.788	89%
Silver	2.000	2.013	101%	2.000	1.924	96%
Thallium	2.000	2.230	112%	2.000	2.143	107%
Zinc	2.000	2.079	104%	2.000	1.948	97%

1) = Except for Mercury; expressed in ug/L

IEA follows all good laboratory practices for environmental sample analysis. Included are the following:

- Laboratory cleanliness and order
- Thorough cleaning of apparatus including glassware
- Use of fresh reagents
- Use of appropriately pure solvents
- Checking quality of internal standard and surrogate solutions and preparing fresh
- Sample custody
- Appropriate sample storage
- Following accepted extraction procedures
- Frequent calibration and recalibration, as needed
- Application of blanks, duplicates, and surrogates (or spikes)

QC/QA as applied to the various analyses performed in described in the following subsections.

J-3.1 Base/Neutral and Acid Extractables

The base neutral and acid extractable compounds were determined by gas chromatography/mass spectrometry. The instrumental conditions used were as follows:

Capillary column - SPB-5, 30m x 0.32 mm I.D.

45°C initial temperature
10°C/min to 300°C
300°C for 25 minutes

Mass spectrometer -

Injector temperature - 275°C
Interface temperature - 300°C

The principal QC/QA applied to the base/neutral and acid extractables (BNA's) included running frequent calibrations of BNA standards vs. internal standards, surrogate standards vs. internal standards and blanks. Typical sequences for analysis are given for two sets of samples in Table J-4.

TABLE J-4. SUMMARY OF ANALYSIS SEQUENCES

Analysis Sequence for Samples 0713, 0714, 0719, 0720, 0723, 0724, and 0732

BNA surrogate standards vs internals standards

BNA standards vs internal standards

BNA blank vs internal standards

BNA's in samples 0720, 0714, 0713, and 0723 vs internal standards and surrogate standards

BNA surrogate standards vs internal standards

BNA standards vs internal standards

BNA's in samples 0724, 0732, and 0719 vs internal standards and surrogate standards

Analysis Sequence for Samples 0668, 0669, 0700 0701, 0706, 0707, 0727, 0727, 0733, 0735, and 0771

BNA surrogate standards vs internal standards

BNA standards vs internal standards

BNA's in samples 0700, 0701, 0706 vs internal standards and surrogate standards

BNA standards vs internal standards

BNA surrogate standards vs internal standards

BNA's in samples 0707, 0735, 0771, 0669, and 0668 vs internal standards and surrogate standards

BNA standards vs internal standards

BNA's in samples 0733, 0727, and 0728 vs internal standards and surrogate standards

Note: Refer to Table J-10 for a summary of analysis data for laboratory QA/QC data reported in Appendix J.

Blanks were monitored for the presence of significant levels of the compounds of interest. If and when these levels were found, the sources of these contaminants were identified and eliminated. Spiking aliquots of the field samples with the compounds of interest was not performed. However, the use of surrogates, which serves the same purpose as spiking, was performed. Surrogates are chemicals which behave in a manner very similar to the chemicals of interest. For example, the extraction efficiency of a surrogate for a compound would have a value very similar to the extraction efficiency of the compound itself. Usually surrogates are unexpected compounds or deuterated compounds which can be easily identified by mass spectrometry. These compounds are spiked into the samples before extraction. The surrogates used in this study and which are in compliance with CLP are as follows:

Surrogate III - d_5-nitrobenzene

Surrogate IV - 2-fluorobiphenyl

Surrogate VI - terphenyl.

Surrogate II - phenol-d_5

Surrogate I - 2-fluorophenol

Surrogate V - 2,4,6-tribromophenol

The CLP has established acceptable ranges or recovery for these surrogates. Recoveries of surrogates have been calculated and are presented in Table J-5. Though not a requirement of this study, most surrogate recoveries were within the CLP ranges of acceptability. The terphenyl and 2-fluorophenol most often yielded high results, though they are usually less than 50 percent above the CLP upper limit. Though not required, a second column verification was performed for a BNA sample, as shown in Table J-6. As noted, excellent repeatability was achieved for the 1,4-dichlorobenzene (RPD of 3.9 percent).

J-3.2 PCB's and Pesticides

PCB's and pesticides were determined using gas chromatography (GC). QC/QA consisted or regular calibration, blanks and duplicates. Single point calibration standards were run at the beginning of every 24-hour analysis period. Blanks and duplicates were run after approximately every ten samples. Blanks were monitored for the presence of significant levels of the compounds

Table J-5. Surrogate Recovery Percentages

Samples

Surrogate	CLP Recovery Ranges	0660	0661	0664	0665	0668	0669	0672	0673
1	21-100%	34.7%	36.1%	26.6%	40.4%	68.6%	58.5%	35.4%	33.7%
2	10-94%	28.0%	27.0%	19.9%	25.9%	47.1%	39.6%	21.8%	20.7%
3	35-114%	116.9%	132.2%	116.3%	90.6%	90.5%	96.0%	90.6%	49.6%
4	43-116%	104.7%	107.1%	91.1%	100.0%	96.4%	110.3%	94.8%	86.5%
5	10-123%	145.9%	114.2%	48.9%	95.4%	199.8%	220.7%	118.8%	61.6%
6	33-141%	109.1%	111.0%	50.2%	49.6%	94.1%	92.4%	77.3%	83.9%

Surrogate	CLP Recovery Ranges	0680	0681	0684	0685	0688	0689	0692	0693
1	21-100%	38.4%	32.8%	38.2%	50.2%	31.8%	27.7%	121.6%	43.8%
2	10-94%	29.5%	23.5%	22.3%	33.1%	17.3%	15.6%	85.0%	28.3%
3	35-114%	154.4%	120.8%	122.3%	91.6%	68.6%	66.7%	108.2%	121.9%
4	43-116%	98.6%	98.0%	128.1%	101.6%	103.9%	96.3%	123.1%	123.9%
5	10-123%	130.2%	67.6%	120.8%	173.8%	75.0%	62.3%	359.5%	148.8%
6	33-141%	108.6%	84.4%	106.9%	88.1%	81.7%	87.2%	96.6%	90.2%

Surrogate	CLP Recovery Ranges	0696	0697	0700	0701	0706	0707	0709	0710
1	21-100%	35.7%	29.1%	38.6%	41.1%	38.1%	54.2%	56.1%	37.0%
2	10-94%	22.4%	17.5%	25.4%	26.6%	25.2%	34.0%	40.3%	28.7%
3	35-114%	75.5%	98.2%	80.6%	70.1%	79.4%	85.3%	60.6%	123.5%
4	43-116%	118.4%	121.8%	92.9%	92.6%	111.8%	102.1%	69.0%	95.7%
5	10-123%	124.8%	100.6%	142.7%	184.4%	214.6%	215.4%	123.2%	100.4%
6	33-141%	101.7%	103.9%	102.7%	94.8%	105.3%	80.4%	113.1%	101.3%

Surrogate	CLP Recovery Ranges	0713	0714	0719	0720	0723	0724	0727	0728
1	21-100%	39.6%	43.6%	21.4%	43.6%	56.1%	27.0%	78.7%	87.9%
2	10-94%	28.3%	29.7%	17.9%	31.8%	40.3%	22.8%	57.4%	60.5%
3	35-114%	73.9%	71.9%	0.8%	17.6%	60.6%	124.3%	96.5%	95.3%
4	43-116%	87.2%	77.6%	35.0%	82.3%	69.0%	90.2%	103.0%	97.8%
5	10-123%	107.9%	96.0%	89.3%	101.3%	123.2%	87.4%	234.1%	
6	33-141%	136.6%	109.5%	53.3%	116.7%	113.1%	117.0%	56.1%	85.3%

Surrogate	CLP Recovery Ranges	0732	0733	0735	0736	0737	0740	0741	0771
1	21-100%	23.0%	71.8%	57.0%	50.9%	42.1%	44.2%	54.9%	64.6%
2	10-94%	17.2%	46.6%	36.6%	33.3%	31.7%	30.4%	35.8%	42.6%
3	35-114%	80.5%	97.8%	93.6%	68.1%	59.9%	70.3%	74.3%	97.6%
4	43-116%	91.3%	97.8%	111.2%	75.5%	93.5%	114.2%	110.6%	110.6%
5	10-123%	72.5%	146.1%	211.0%	136.2%	91.5%	92.2%	109.7%	232.8%
6	33-141%	103.1%	83.5%	102.0%	112.2%	126.5%	117.3%	122.5%	93.3%

TABLE J-6. SUMMARY OF LABORATORY QA/QC DATA (SECOND COLUMN CONFIRMATION) FOR BASE/NEUTRAL EXTRACTABLES (WATER); p. 1 of 1

			1)	
	SAMPLING POINT:	MW-51	MW-51	
	STICKER NO., ID:	713,E1	714,E2	
	APPENDIX TABLE, PAGE:	R-3,2	R-3,2	RPD
COMPOUND	DETECTION LIMIT (ug/L)			
Acenaphthene	25	BDL	BDL	
Acenaphthylene	10	BDL	BDL	
Anthracene	10	BDL	BDL	
Benzidine	10	BDL	BDL	
Benzo (a) Anthracene	10	BDL	BDL	
Benzo (a) Pyrene	10	BDL	BDL	
Benzo (b) Fluoranthene	10	BDL	BDL	
Benzo (ght) Perylene	25	BDL	BDL	
Benzo (k) Fluoranthene	10	BDL	BDL	
Bis (2-Chloroethoxy) Methane	10	BDL	BDL	
Bis (2-Chloroethyl) Ether	10	BDL	BDL	
Bis (2-Chloroisopropyl) Ether	10	BDL	BDL	
Bis (2-Ethylhexyl) Phthalate	10	BDL	BDL	
4-Bromophenyl Phenyl Ether	10	BDL	BDL	
Benzyl Butyl Phthalate	10	BDL	BDL	
2-Chloronaphthalene	10	BDL	BDL	
4-Chlorophenyl Phenyl Ether	10	BDL	BDL	
Chrysene	10	BDL	BDL	
Dibenzo (a,h) Anthracene	10	BDL	BDL	
1,2-Dichlorobenzene	10	BDL	BDL	
1,3-Dichlorobenzene	10	BDL	BDL	
1,4-Dichlorobenzene	10	26	25	3.9%
3,3-Dichlorobenzidine	10	BDL	BDL	
Diethyl Phthalate	10	BDL	BDL	
Dimethyl Phthalate	10	BDL	BDL	
Di-N-Butyl Phthalate	10	BDL	BDL	
2,4-Dinitrotoluene	10	BDL	BDL	
2,6-Dinitrotoluene	10	BDL	BDL	
Di-N-Octylphthalate	10	BDL	BDL	
Fluoranthene	10	BDL	BDL	
Fluorene	10	BDL	BDL	
Hexachlorobenzene	10	BDL	BDL	
Hexachlorobutadiene	10	BDL	BDL	
Hexachlorocyclopentadiene	10	BDL	BDL	
Hexachloroethane	10	BDL	BDL	
Indeno (1,2,3-cd) Pyrene	25	BDL	BDL	
Isophorone	10	BDL	BDL	
Naphthalene	10	BDL	BDL	
Nitrobenzene	10	BDL	BDL	
N-Nitrosodimethylamine	10	BDL	BDL	
N-Nitroso-Di-N-Propylamine	10	BDL	BDL	
N-Nitrosodiphyenylamine	10	BDL	BDL	
Phenanthrene	10	BDL	BDL	
Pyrene	10	BDL	BDL	
1,2,4-Trichlorobenzene	10	BDL	BDL	

BDL = Below Detection Limit

RPD = Relative Percent Difference

1) = Second Column Confirmation of 713,E1

of interest. If and when found, their source was identified and eliminated. Duplicates were run on samples which showed significant levels of compounds of interest, or on random samples if such levels were not found. Levels of reproducibility were monitored and samples reanalyzed if acceptable reproducibility was not achieved. These levels, have been established by IEA and are CLP-based, range from ±400 percent near the detection limit to ± a few percent at high levels.

When one of these species is tentatively identified using GC, it is confirmed using gas chromatography/mass spectrometry (GC/MS). As noted, no PCB's or pesticides were found and thus no confirmation analyses were required.

J-3.3 Petroleum Hydrocarbons

Petroleum hydrocarbons were also determined by purge and trap GC. Calibrations, blanks and duplicates were made as described in Section J-3. Second column verification was not required for these compounds.

J-3.4 Non-Halogenated Organic Compounds

Non-halogenated organic compounds were determined by GC following the same QA/QC procedures described in Section J-3. No non-halogenated compounds were found and thus no second column confirmation was performed.

J-3.5 Halogenated Organic Compounds

Halogenated organic compounds were determined by purge and trap GC with PID/Hall detection following the QA/QC procedures described in Section J-3. The column and conditions for these measurements were:

1% SP1000 on 60/80 Carbopak B, 8' x 1/8"

45°C for 3 minutes
8°C/min to 220°C
220°C for 25 min

Second column confirmation using GC with FID detection was performed with these samples as several of the compounds of interest were identified. The column and conditions for these measurements were:

3% SP1500 on 80/120 Carbopak B, 10' x 1/8"

70°C for 2 min
6°C/min to 225°C
225°C for 20 min

The results of second column confirmation for soils are shown in Table J-7 and for waters in Table J-8. The results for the soils compare favorably in that no compounds were detected in either of the paired samples. As noted, agreement is generally good for the water samples, and the RPDs exceed 100 percent only when the values are near the detection limits. An average RPD of 56.2 percent was determined for all compounds detected in the water (Table J-8).

J-3.6 Aromatic Volatile Organic Compounds

Aromatic volatile organic compounds were determined by purge and trap GC with PID/Hall detection following the QA/QC procedures described in Section J-3. The column and conditions for this measurement are described in Section J-3. Second column confirmation was performed with these samples as several of the compounds of interest were identified. The column and conditions for these measurements were:

5% SP1200 on 60/80 Carbopak B, 8' x 1/8"

50°C for 3 min
8°C/min to 100°C
100°C for 15 min

The results of second column confirmation for waters are shown in Table J-9. As noted, agreement is generally good, with RPDs all less than 100 percent. An average RPD of 23.2 percent was determined for all compounds detected.

TABLE J-7. SUMMARY OF LABORATORY QA/QC DATA (SECOND COLUMN CONFIRMATION) FOR FOR HALOGENATED VOLATILE ORGANICS (SOIL); p. 1 of 1

			1)		2)
SAMPLING POINT:		SD-12	SD-12	SD-13	SD-13
STICKER NO., ID:		806,A	806,A1	807,A1	807,A2
APPENDIX TABLE, PAGE:		N-12,1	N-12,1	N-12,1	N-12,1
COMPOUND	DETECTION LIMIT (ug/Kg)				
Bromodichloromethane	1.0	BDL	BDL	BDL	BDL
Bromoform	1.0	BDL	BDL	BDL	BDL
Bromomethane	1.0	BDL	BDL	BDL	BDL
Carbon Tetrachloride	1.0	BDL	BDL	BDL	BDL
Chlorobenzene	1.0	BDL	BDL	BDL	BDL
Chloroethane	1.0	BDL	BDL	BDL	BDL
2-Chlorethylvinyl Ether	1.0	BDL	BDL	BDL	BDL
Chloroform	1.0	BDL	BDL	BDL	BDL
Chloromethane	1.0	BDL	BDL	BDL	BDL
Dibromochloromethane	1.0	BDL	BDL	BDL	BDL
1,2-Dichlorobenzene	1.0	BDL	BDL	BDL	BDL
1,3-Dichlorobenzene	1.0	BDL	BDL	BDL	BDL
1,4-Dichlorobenzene	1.0	BDL	BDL	BDL	BDL
Dichlorodifluoromethane	1.0	BDL	BDL	BDL	BDL
1,1-Dichloroethane	1.0	BDL	BDL	BDL	BDL
1,2-Dichloroethane	1.0	BDL	BDL	BDL	BDL
1,1-Dichloroethene	1.0	BDL	BDL	BDL	BDL
trans-1,2-Dichloroethene	1.0	BDL	BDL	BDL	BDL
1,2-Dichloropropane	1.0	BDL	BDL	BDL	BDL
cis-1,3-Dichloropropene	1.0	BDL	BDL	BDL	BDL
trans-1,3-Dichloropropene	1.0	BDL	BDL	BDL	BDL
Methylene Chloride	1.0	BDL	BDL	BDL	BDL
1,1,2,2-Tetrachloroethane	1.0	BDL	BDL	BDL	BDL
1,1,1-Trichloroethane	1.0	BDL	BDL	BDL	BDL
1,1,2-Trichloroethane	1.0	BDL	BDL	BDL	BDL
Tetrachloroethene	1.0	BDL	BDL	BDL	BDL
Trichlorofluoromethane	1.0	BDL	BDL	BDL	BDL
Vinyl Chloride	1.0	BDL	BDL	BDL	BDL
Trichloroethene	1.0	BDL	BDL	BDL	BDL

BDL = Below Detection Limits
1) = Second Column Confirmation of 806,A
2) = Second Column Confirmation of 807,A1

TABLE J-8. SUMMARY OF LABORATORY QA/QC DATA (SECOND COLUMN CONFIRMATION) FOR HALOGENATED VOLATILE ORGANICS (WATER); p. 1 of 4

		1)			2)			3)		
	SAMPLING POINT:	MW-41	MW-41		MW-13	MW-13		MW-44	MW-44	
	STICKER NO., ID:	579,A1	580,A2		589,A1	590,A2		581,A1	582,A2	
	APPENDIX TABLE, PAGE:	L-2,1	L-2,1	RPD	N-5,1	N-5,1	RPD	N-5,2	N-5,2	RPD
COMPOUND	DETECTION LIMIT (ug/L)									
Bromodichloromethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Bromoform	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Bromomethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Carbon Tetrachloride	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Chlorobenzene	1.0	23.0	13.0	55.6%	BDL	BDL		BDL	BDL	
Chloroethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
2-Chlorethylvinyl Ether	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Chloroform	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Chloromethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Dibromochloromethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
1,2-Dichlorobenzene	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
1,3-Dichlorobenzene	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
1,4-Dichlorobenzene	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Dichlorodifluoromethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
1,1-Dichloroethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
1,2-Dichloroethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
1,1-Dichloroethene	1.0	BDL	BDL		BDL	22.0		BDL	BDL	
trans-1,2-Dichloroethene	1.0	BDL	BDL		41.0	52.0	23.7%	3.6	18.0	133.3%
1,2-Dichloropropane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
cis-1,3-Dichloropropene	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
trans-1,3-Dichloropropene	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Methylene Chloride	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
1,1,2,2-Tetrachloroethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
1,1,1-Trichloroethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
1,1,2-Trichloroethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Tetrachloroethene	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Trichlorofluoromethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Vinyl Chloride	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Trichloroethene	1.0	BDL	BDL		3.8	16.0	123.2%	BDL	BDL	

BDL = Below Detection Limit

RPD = Relative Percent Difference

1) = Second Column Confirmation of 579,A1

2) = Second Column Confirmation of 589,A1

3) = Second Column Confirmation of 581,A1

TABLE J-8. SUMMARY OF LABORATORY QA/QC DATA (SECOND COLUMN CONFIRMATION) FOR HALOGENATED VOLATILE ORGANICS (WATER); p. 2 of 4

		1)			2)			3)		
SAMPLING POINT:		MW-45	MW-45		MW-46	MW-46		MW-49	MW-49	
STICKER NO., ID:		583,A1	584,A2		585,A1	586,A2		587,A1	588,A2	
APPENDIX TABLE, PAGE:		N-5,3	N-5,3	RPD	N-5,4	N-5,4	RPD	N-5,5	N-5,5	RPD
COMPOUND	DETECTION LIMIT (ug/L)									
Bromodichloromethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Bromoform	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Bromomethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Carbon Tetrachloride	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Chlorobenzene	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Chloroethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
2-Chlorethylvinyl Ether	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Chloroform	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Chloromethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Dibromochloromethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
1,2-Dichlorobenzene	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
1,3-Dichlorobenzene	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
1,4-Dichlorobenzene	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Dichlorodifluoromethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
1,1-Dichloroethane	1.0	6.0	6.3	4.9%	BDL	BDL		BDL	BDL	
1,2-Dichloroethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
1,1-Dichloroethene	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
trans-1,2-Dichloroethene	1.0	1.0	3.5	111.1%	13.0	17.0	26.7%	1.7	6.4	116.0%
1,2-Dichloropropane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
cis-1,3-Dichloropropene	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
trans-1,3-Dichloropropene	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Methylene Chloride	1.0	6.0	BDL		BDL	BDL		BDL	BDL	
1,1,2,2-Tetrachloroethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
1,1,1-Trichloroethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
1,1,2-Trichloroethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Tetrachloroethene	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Trichlorofluoromethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Vinyl Chloride	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Trichloroethene	1.0	BDL	BDL		3.6	10.0	94.1%	BDL	BDL	

BDL = Below Detection Limit
RPD = Relative Percent Difference
1) = Second Column Confirmation of 583,A1
2) = Second Column Confirmation of 585,A1
3) = Second Column Confirmation of 587,A1

TABLE J-8. SUMMARY OF LABORATORY QA/QC DATA (SECOND COLUMN CONFIRMATION) FOR HALOGENATED VOLATILE ORGANICS (WATER); p. 3 of 4

		1)			2)			3)		
	SAMPLING POINT:	MW-51	MW-51		MW-52	MW-52		MW-54	MW-54	
	STICKER NO., ID:	69,A1	69,A1		73,A2	73,A2		77,A2	77,A4	
	APPENDIX TABLE, PAGE:	R-4,1	R-4,1	RPD	R-4,2	R-4,2	RPD	T-4,1	T-4,1	RPD
COMPOUND	DETECTION LIMIT (ug/L)									
Bromodichloromethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Bromoform	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Bromomethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Carbon Tetrachloride	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Chlorobenzene	1.0	15.0	12.0	22.2%	8.0	8.0	0.0%	BDL	BDL	
Chloroethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
2-Chlorethylvinyl Ether	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Chloroform	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Chloromethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Dibromochloromethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
1,2-Dichlorobenzene	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
1,3-Dichlorobenzene	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
1,4-Dichlorobenzene	1.0	7.0	14.0	66.7%	13.0	12.0	8.0%	BDL	BDL	
Dichlorodifluoromethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
1,1-Dichloroethane	1.0	BDL	BDL		BDL	BDL		6.0	BDL	
1,2-Dichloroethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
1,1-Dichloroethene	1.0	BDL	BDL		BDL	BDl		BDL	BDL	
trans-1,2-Dichloroethene	1.0	BDL	BDL		BDL	BDL		12.0	12.0	0.0%
1,2-Dichloropropane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
cis-1,3-Dichloropropene	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
trans-1,3-Dichloropropene	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Methylene Chloride	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
1,1,2,2-Tetrachloroethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
1,1,1-Trichloroethane	1.0	BDL	BDL		BDL	BDL		25	BDL	
1,1,2-Trichloroethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Tetrachloroethene	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Trichlorofluoromethane	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Vinyl Chloride	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Trichloroethene	1.0	BDL	BDL		BDL	BDL		79.0	22.0	112.9%

BDL = Below Detection Limit

RPD = Relative Percent Difference

1) = S[illegible]nd C[illegible] Con[illegible]ation [illegible] 69,A[illegible]

2) = Second Column Confirmation of 73,A2

3) = S[illegible]d Co[illegible] Conf[illegible]tion [illegible]7,A2

TABLE J-8. SUMMARY OF LABORATORY QA/QC DATA (SECOND COLUMN CONFIRMATION) FOR HALOGENATED VOLATILE ORGANICS (WATER); p. 4 of 4

COMPOUND	DETECTION LIMIT (ug/L)		1)	
SAMPLING POINT:		SW-13	SW-13	
STICKER NO., ID:		547,A2	547,A2	
APPENDIX TABLE, PAGE:				RPD
Bromodichloromethane	1.0	BDL	BDL	
Bromoform	1.0	BDL	BDL	
Bromomethane	1.0	BDL	BDL	
Carbon Tetrachloride	1.0	BDL	BDL	
Chlorobenzene	1.0	BDL	BDL	
Chloroethane	1.0	BDL	BDL	
2-Chlorethylvinyl Ether	1.0	BDL	BDL	
Chloroform	1.0	BDL	BDL	
Chloromethane	1.0	BDL	BDL	
Dibromochloromethane	1.0	BDL	BDL	
1,2-Dichlorobenzene	1.0	BDL	BDL	
1,3-Dichlorobenzene	1.0	BDL	BDL	
1,4-Dichlorobenzene	1.0	BDL	BDL	
Dichlorodifluoromethane	1.0	BDL	BDL	
1,1-Dichloroethane	1.0	BDL	BDL	
1,2-Dichloroethane	1.0	BDL	BDL	
1,1-Dichloroethene	1.0	BDL	BDL	
trans-1,2-Dichloroethene	1.0	BDL	BDL	
1,2-Dichloropropane	1.0	BDL	BDL	
cis-1,3-Dichloropropene	1.0	BDL	BDL	
trans-1,3-Dichloropropene	1.0	BDL	BDL	
Methylene Chloride	1.0	BDL	BDL	
1,1,2,2-Tetrachloroethane	1.0	BDL	BDL	
1,1,1-Trichloroethane	1.0	BDL	BDL	
1,1,2-Trichloroethane	1.0	BDL	BDL	
Tetrachloroethene	1.0	BDL	BDL	
Trichlorofluoromethane	1.0	BDL	BDL	
Vinyl Chloride	1.0	BDL	BDL	
Trichloroethene	1.0	3.0	3.0	0.0%

BDL = Below Detection Limit
RPD = Relative Percent Difference
1) = Second Column Confirmation of 547,A2

TABLE J-9. SUMMARY OF LABORATORY QA/QC DATA (SECOND COLUMN CONFIRMATION) FOR AROMATIC VOLATILE ORGANICS (WATER); p. 1 of 2

		1)			2)			3)		
	SAMPLING POINT:	MW-41	MW-41		MW-13	MW-13		MW-46	MW-46	
	STICKER NO., ID:	579,A1	579,A1		589,A1	589,A2		585,A1	585,B1	
	APPENDIX TABLE, PAGE:	L-1,1	L-1,1	RPD	N-2,1	N-2,1	RPD	N-2,3	N-2,3	RPD
COMPOUND	DETECTION LIMIT (ug/L)									
Benzene	1.0	BDL	BDL		7.0	7.0	0.0%	5.0	5.0	0.0%
Chlorobenzene	1.0	8.0	11.0	31.6%	BDL	BDL		BDL	BDL	
1,2-Dichlorobenzene	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
1,3-Dichlorobenzene	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
1,4-Dichlorobenzene	1.0	3.0	BDL		BDL	BDL		BDL	BDL	
Ethylbenzene	1.0	BDL	BDL		BDL	BDL		BDL	BDL	
Toluene	1.0	BDL	BDL		BDL	BDL		BDL	BDL	

BDL = Below Detection Limit
RPD = Relative Percent Difference
1) = Second Column Confirmation of 579,A1
2) = Second Column Confirmation of 589,A1
3) = Second Column Confirmation of 585,A1

TABLE J-9. SUMMARY OF LABORATORY QA/QC DATA (SECOND COLUMN CONFIRMATION) FOR AROMATIC VOLATILE ORGANICS (WATER); p. 2 of 2

		1)			2)			3)	
SAMPLING POINT:		MW-51	MW-51		MW-52	MW-52		MW-54	MW-54
STICKER NO., ID:		69,A1	69,A1		73,A1	73,A2		77,A1	78,A3
APPENDIX TABLE, PAGE:		R-2,1	R-2,1	RPD	R-2,1	R-2,1	RPD	T-2,1	T-2,1
COMPOUND	DETECTION LIMIT (ug/L)								
Benzene	1.0	2.0	2.0	0.0%	BDL	BDL		BDL	BDL
Chlorobenzene	1.0	15.0	12.0	22.2%	8.0	7.0	13.3%	BDL	BDL
1,2-Dichlorobenzene	1.0	BDL	BDL		BDL	BDL		BDL	BDL
1,3-Dichlorobenzene	1.0	BDL	BDL		BDL	BDL		BDL	BDL
1,4-Dichlorobenzene	1.0	7.0	14.0	66.7%	13.0	12.0	8.0%	BDL	BDL
Ethylbenzene	1.0	BDL	BDL		BDL	BDL		BDL	BDL
Toluene	1.0	4.0	2.0	66.7%	BDL	BDL		BDL	BDL

BDL = Below Detection Limit
RPD = Relative Percent Difference
1) = Second Column Confirmation of 69,A1
2) = Second Column Confirmation of 73,A1
3) = Second Column Confirmation of 77,A1

TABLE J-10. SUMMARY OF ANALYSIS DATES FOR LABORATORY QA/QC DATA

PARAMETER AND SAMPLER ID	APPENDIX TABLE, PAGE	RTI/IEA REPORT NO.	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED
13 Priority Pollutant Metals					
SB-56, 30.D	S-7, 2	RTI	12 NOV 86	---	12 DEC 86
SB-56, lab duplicate		RTI	12 NOV 86	---	12 DEC 86
SD-13, 358.C	M-5, 1	RTI	20 JAN 87	---	10 FEB 87
SD-13, lab duplicate		RTI	20 JAN 87	---	10 FEB 87
Total Metals Screen					
SB-58, 7.A	U-1, 1	RTI	14 OCT 87	---	OCT, NOV 86
SB-58, lab duplicate		RTI	14 OCT 87	---	OCT, NOV 86
SB-60, 5.A	U-1,3	RTI	14 OCT 87	---	OCT, NOV 86
SB-60, lab duplicate		RTI	14 OCT 87	---	OCT, NOV 86
13 Priority Pollutant Metals					
MW-45, 355	M-2, 1	RTI	16 JAN 87	---	29 JAN 87
MW-45, lab duplicate		RTI	---	---	---
MW-12, 333	O-2, 1	RTI	16 JAN 87	---	29 JAN 87
MW-12, lab duplicate		RTI	---	---	---
SW-10, 434	M-6, 1	RTI	21 JAN 87	---	2 FEB 87
SW-10, lab duplicate		RTI	---	---	---
MW-54, 464	S-4, 1	RTI	23 JAN 87	---	8 FEB 87
MW-54, lab duplicate		RTI	---	---	---
Base/Neutral Extractables					
MW-51, 713.E1	R-3, 2	103-134	15 APR 87	22 APR 87	12 MAY 87
MW-51, 714.E2	R-3, 2	103-134	15 APR 87	22 APR 87	12 MAY 87
SD-12, 806.A	N-12, 1	103-123	25 FEB 87	---	1 MAR 87
SD-12, 806.A1	N-12, 1	103-123	25 FEB 87	---	12 MAR 87
SD-13, 807.A1	N-12, 1	103-123	25 FEB 87	---	1 MAR 87
SD-13, 807.A2	N-12, 1	103-123	25 FEB 87		12 MAR 87

MW-41, 579.A1	L-2, 1	103-123	26 FEB 87	---	1 MAR 87
MW-41, 580.A2	L-2, 1	103-123	26 FEB 87	---	11 MAR 87
MW-13, 589.A1	N-5, 1	103-123	26 FEB 87	---	1 MAR 87
MW-13, 599.A2	N-5, 1	103-123	26 FEB 87	---	11 MAR 87
MW-44, 581.A1	N-5, 2	103-123	26 FEB 87	---	1 MAR 87
MW-44, 582.A2	N-5, 2	103-123	26 FEB 87	---	11 MAR 87
MW-45, 583.A1	N-5, 3	103-123	26 FEB 87	---	1 MAR 87
MW-45, 583.A2	N-5, 3	103-123	26 FEB 87	---	11 MAR 87
MW-46, 585.A1	N-5, 4	103-123	26 FEB 87	---	1 MAR 87
MW-46, 585.A2	N-5, 4	103-123	26 FEB 87	---	11 MAR 87
MW-49, 587.A1	N-5, 5	103-123	26 FEB 87	---	26 FEB 87
MW-49, 588.A2	N-5, 5	103-123	26 FEB 87	---	11 MAR 87
MW-51, 69.A1	R-4, 1	103-126	5 MAR 87	---	12 MAR 87
MW-51, 69.A2	R-4, 1	103-126	5 MAR 87	---	12 MAR 87
MW-52, 73.A2	R-4, 2	103-126	5 MAR 87	---	12 MAR 87
MW-52, 73.A2	R-4, 2	103-126	5 MAR 87	---	12 MAR 87
MW-54, 77.A2	T-4, 1	103-125	2 MAR 87	---	3 MAR 87
MW-54, 77.A4	T-4, 1	103-125	2 MAR 87	---	3 MAR 87
SW-13, 547.A2		103-125		---	3 MAR 87
SW-13, 547.A2		103-125		---	3 MAR 87
MW-41, 579.A1	L-1, 1	103-123	25 FEB 87	---	11 MAR 87
MW-41, 579.A2	L-1, 1	103-123	25 FEB 87	---	11 MAR 87
MW-13, 589.A1	N-2, 1	103-123	26 FEB 87	---	2 MAR 87
MW-13, 589.A2	N-2, 1	103-123	26 FEB 87	---	2 MAR 87
MW-46, 585.A1	N-2, 3	103-123	26 FEB 87	---	2 MAR 87
MW-46, 585.B1	N-2, 3	103-123	26 FEB 87	---	2 MAR 87
MW-51, 69.A1	R-2, 1	103-126	5 MAR 87	---	12 MAR 87
MW-51, 69.A1	R-2, 1	103-126	5 MAR 87	---	12 MAR 87
MW-52, 73.A1	R-2, 1	103-126	5 MAR 87	---	12 MAR 87
MW-52, 73.A2	R-2, 1	103-126	5 MAR 87	---	12 MAR 87
MW-54, 77.A1	T-2, 1	103-125	2 MAR 87	---	3 MAR 87
MW-54, 78.A3	T-2, 1	103-125	2 MAR 87	---	3 MAR 87